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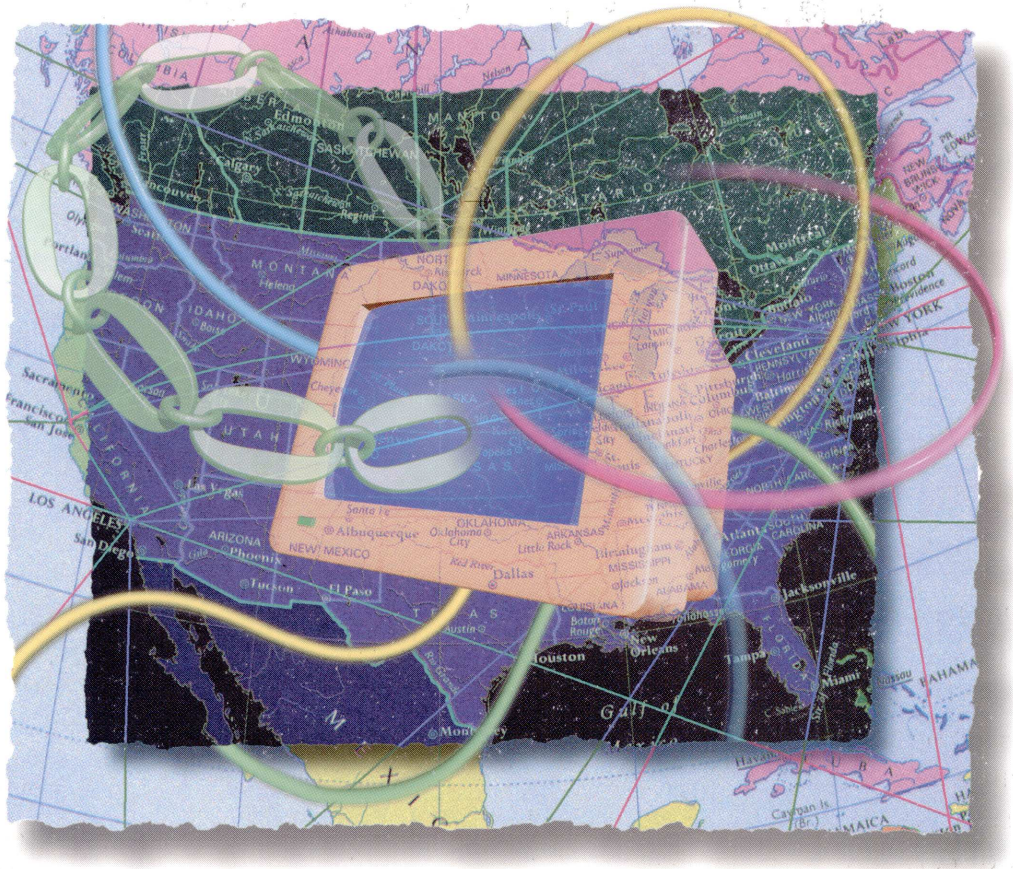

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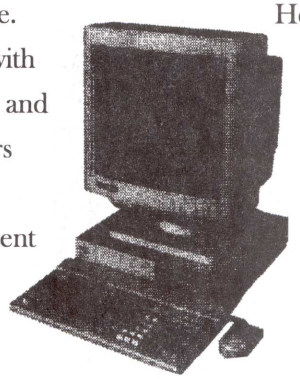

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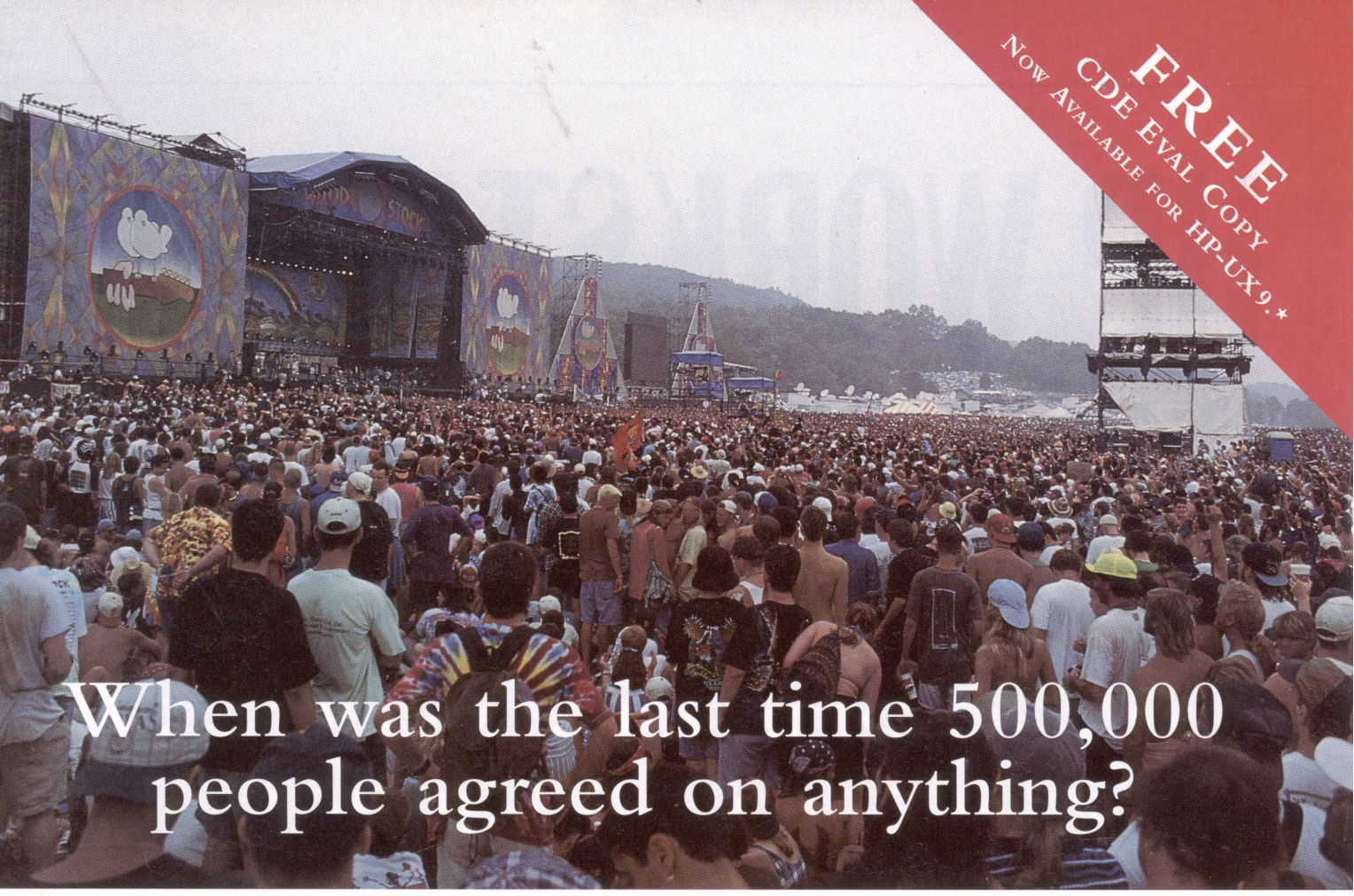

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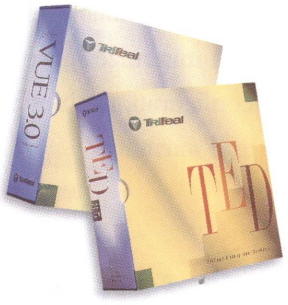

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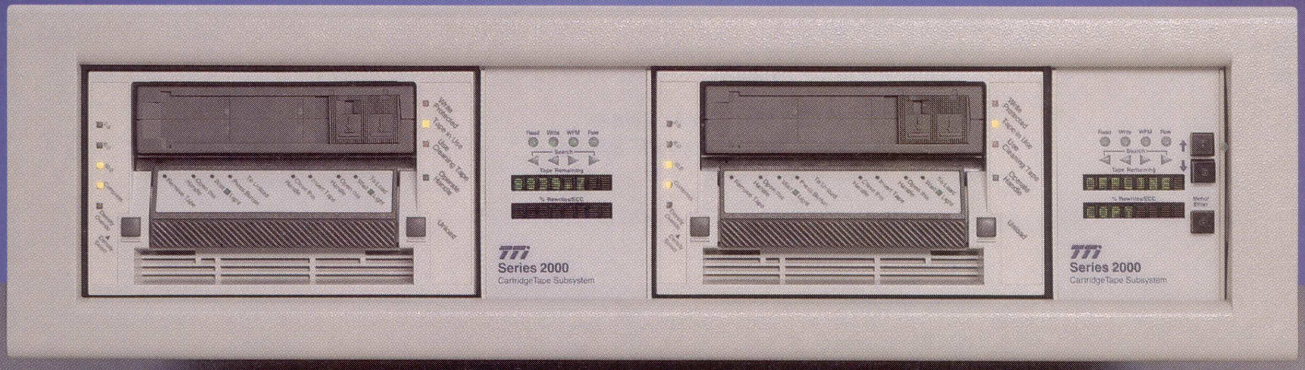

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allows you to write the same data to both drives simultaneously.

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CIRCLE 27 ON READER SERVICE CARD

hp·ux/usr

Volume 3, Number 3 May 1995

Contents

page 36

Features

Interex Toronto Conference		18
Networking Background for System Administrators, Part 1	*by Marty Poniatowski*	22
Software Review: Z-Mail	*by Greg Cagle*	30
Building Programs from the Internet	*by Sean Reifschneider*	36
Book Review: UNIX System Administration Handbook, 2nd Edition	*by Chris Curtin*	40
DAA Modem Control MUX Panel for the HP 1000 A and and F Series	*by Wendy L. King*	44

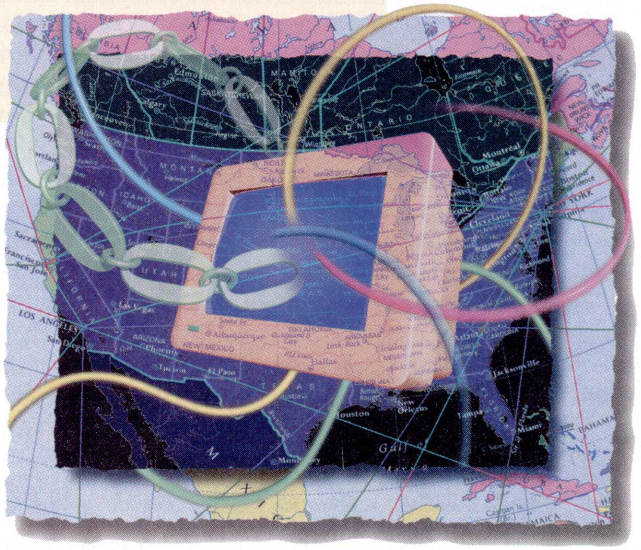
Departments

Q & A		8
HP 1000 Guru		70
CSL Perspective		76
Industry Watch		78
Product Focus		80
New Products		82

Columns

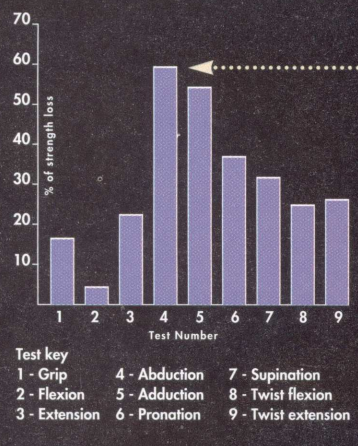
HP-UX Systems Administration	*by Chris Curtin*	56
HP-UX	*by David L. Totsch*	60
Internet Goodies	*by Joe Berry*	62
X-Watch	*by Larry Headlund*	66

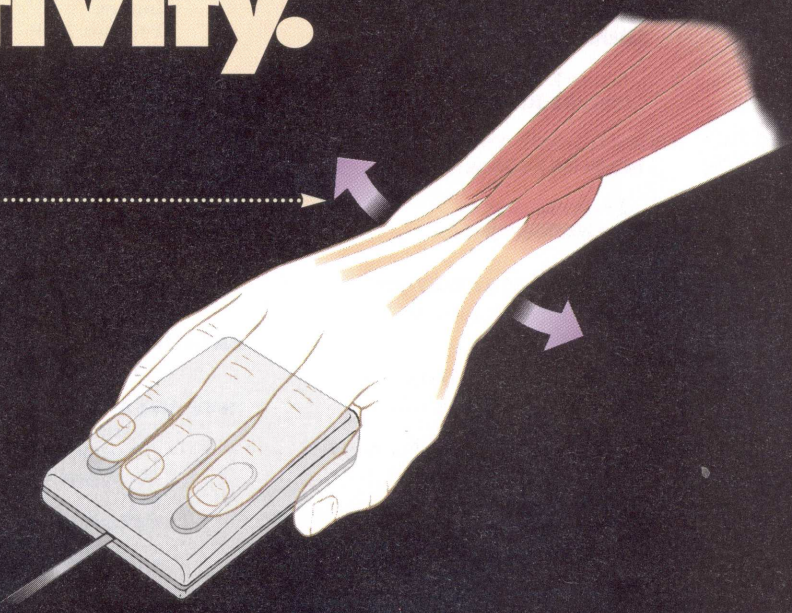
New Products
See page 82



Cover Story:
See page 22

Lose your mouse and increase your productivity.





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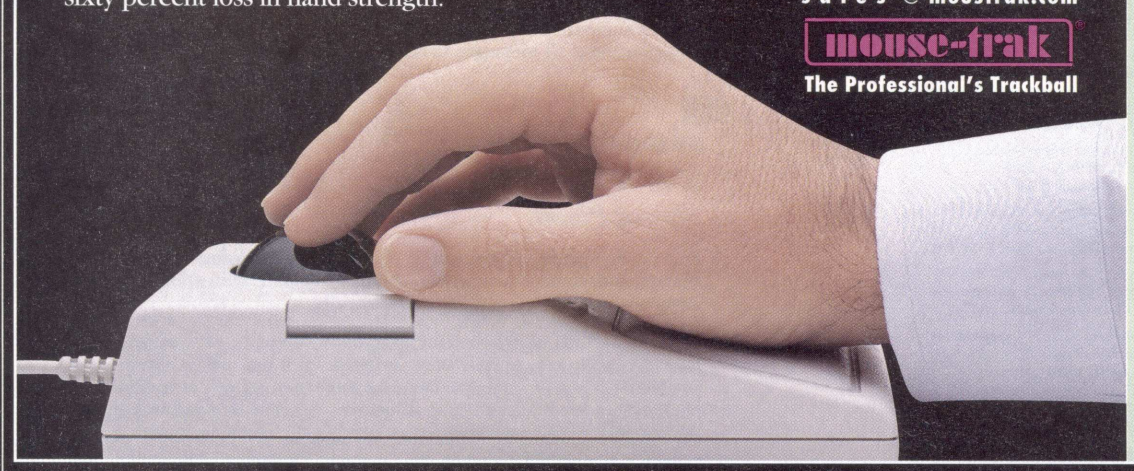

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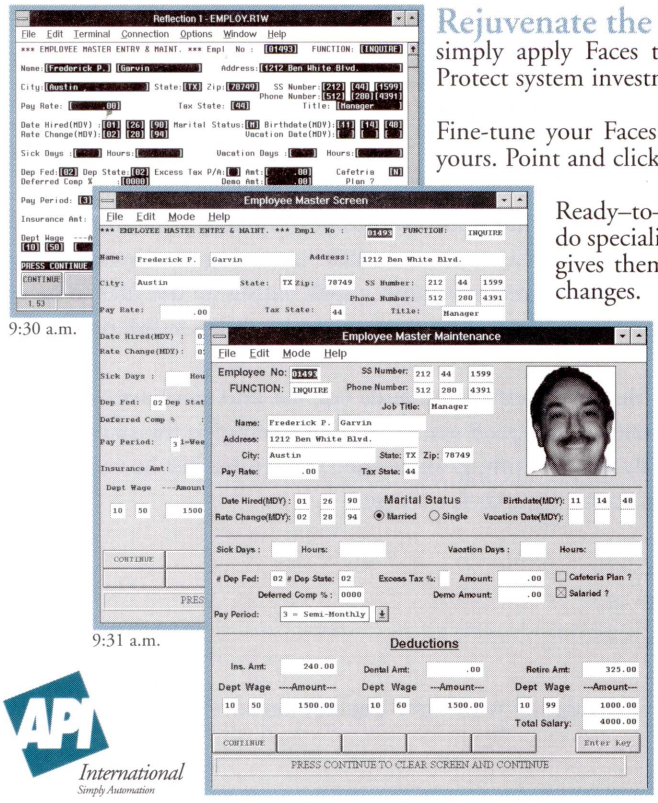

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Question & Answer

Q: My users are complaining that *cp* and *mv* are not 'friendly', that they will overlay an existing file without comment. An example is moving a series of files to a directory and misspelling the directory name, which causes all the files to be concatenated into one big file. How can I fix the command always to ask permission?

A: All three of the file movement commands (*cp*, *mv*, and *rm*) have an -i option but users will seldom use it. So a good workaround is to change the standard command with an alias (ksh and csh only, Bourne shell users must just be very careful). Here is an example in .kshrc (similar for .cshrc):

```
alias cp='/bin/cp -i'
alias mv='/bin/mv -i'
alias rm='/bin/rm -i'
```

Now, every time an existing file is about to get clobbered, the command will ask for permission.

Q: How can I determine the speed of my computer?

A: For the PA-RISC processors (Series 700 and 800), you can (as root) use:

```
adb -k /hp-ux /dev/mem
itick_per_tick/D
CTRL-D
```

Whatever the result is, either multiply by 100 to get the frequency in Hz or divide by 10000 to get the frequency in MHz. Here is an example in a script:

```
MHZ=`echo itick_per_tick/D | adb /hp-ux /dev/kmem \
                | tail -1 | awk '{print $2/10000}'`
```

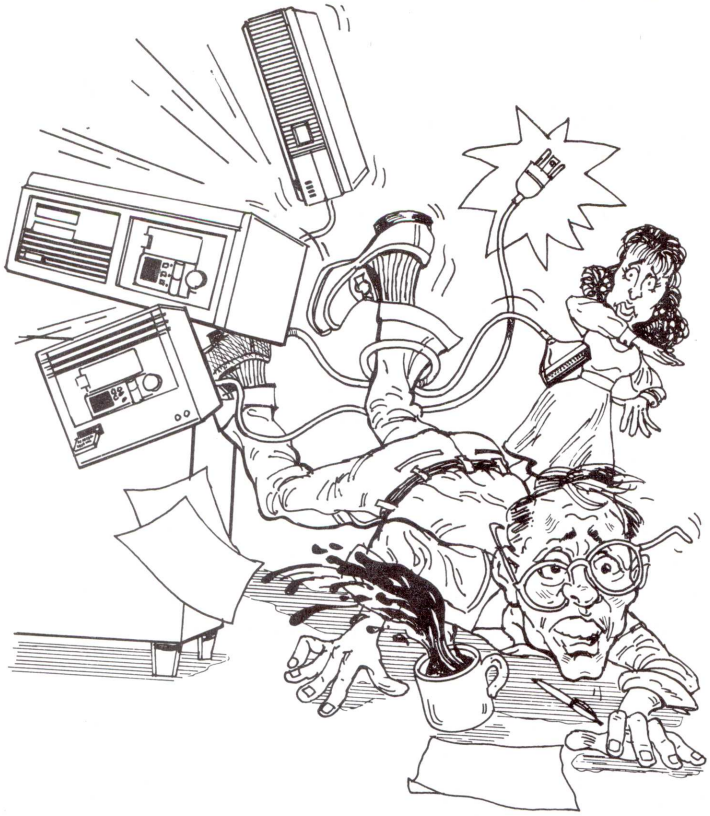
Then: `echo $MHZ` will return the processor's speed in megahertz. This would be helpful for the Series 700 where new models of the 700 return the same ID from *uname(1)* but have a different clock speed, as with the 715/100.

Another method involves reading the kernel for this information. Note that this method, though more accurate than just the processor clock speed, does require a lookup table. In addition, this method is limited to HP-UX Version 9.0x only and does not work for Series 300/400.

Each processor has a hardware version associated with it. This is read into kernel memory at boot time and is accessible by the diagnostics. It involves accessing hversion on the running system, using(1). Here are the steps:

Series 700:

```
echo "mpproc_info+34/X" | adb -k /hp-ux /dev/kmem
```



It was UGLY.

Joe bit it when he tripped over a mess of SCSI and power cables (12 stitches). Two days ago, he disconnected the server from the network (4 hours downtime). Last week, he was taking apart a tape drive he thought was bad when his screwdriver slipped and hit the power supply (fried drive, power out for two hours). Stacy tried to help him out and called the vendor to get a replacement for the fried drive, only to find out it would be two days before one could be shipped (2 days without backup).

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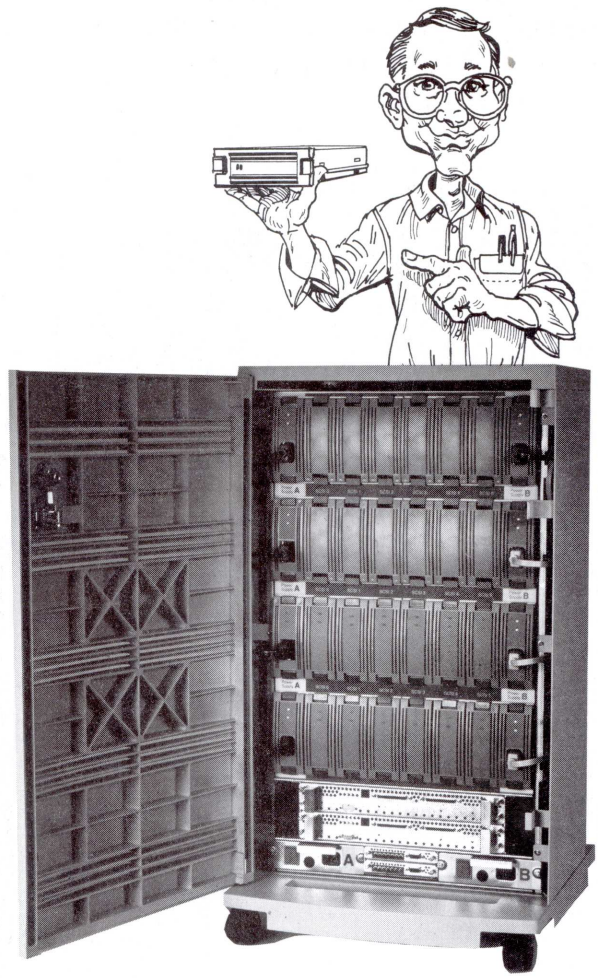
Since there are no loose cables to trip over, Joe listens to his Walkman and dances around the lab freely with no fear of stitches or disconnecting the network. If a device goes down, Joe just slides it out of its slot and replaces it with another. He has retired his screwdrivers to the toolbox -- far away from the lab.



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```
echo "mpproc_info+1E8/X" | adb -k /hp-ux /dev/kmem
```

Caveat: This is valid for PA-RISC systems running some version of 9.0 and will not work on pre-9.0 systems. For Version 10.0, look for a new processor ID command.

The value returned can be compared to *Table 1* to determine exactly which hardware the system is running on.

This method will also work on a crashdump. Use the kernel file (e.g, *hp-ux.0*) and crashfile (e.g., *hp-core.0*) instead of the actual kernel and memory as in:

```
echo "mpproc_info+1E8/ X"|adb hp-ux.0 hp-core.
```

There may be new models not yet released that aren't listed. At 10.0, this technique can be replaced with a simple command.

TABLE 1

SERIES 700 –

HVERSION	MODEL	HVERSION	MODEL	HVERSION	MODEL
2000	720	3130	715s/33	6010	712/80
2010	750	3140	715t/50	6020	712/100
2020	730	3150	715t/33	6030	743i/60
2030	735	3160	715/75	6040	743i/100
2040	755	3180	725/50	60A0	715/64
2060	735/125	3190	725/75	60B0	715/100
3000	710	4010	745i/50	60D0	725/100
3020	705	4020	742i	6170	V743i
3100	715/50	4030	745i/100	6180	V743i/100
3110	715/33	6000	712/60	6190	715/80
3120	715s/50				

SERIES 800 –

HVERSION	MODEL	HVERSION	MODEL	HVERSION	MODEL
0040	840	1810	890	4800	806/E25
0080	825	1820	891/T500	4810	816/E35
00A0	835/635	1830	892/T520	4820	826/E45
00B0	845/645	2800	817/F20	4830	856/E55
00C0	850	2800	827/H20	2840	897/I50
0810	855	2810	837/F30	2870	887/G70/H70
0820	860	2810	847/G30/H30	2870	897/I70
1010	822	2820	807/F10	2880	887/G60/H60
1020	832	2830	867/G40/H40	2880	897/I60
1040	842	2830	877/I40		
1050	852	2840	887/G50/H50		

Q: I am having problems with my external CD-ROM drive connected to a new 9000/712. It is quite erratic and yet works fine on older systems.

A: The 712 as well as several newer 700 computers have a redesigned SCSI controller that is sensitive to cable lengths. Cables that are too *short* will cause problems with CD-ROM drives, as well as with magneto-optical drives. Using a longer cable should fix the problem.

Q: How can I force an eject of a CD-ROM or optical disc from a SCSI drive?

A: Here is a simple program to accomplish this task:

```
#include <sys/scsi.h>
eject_caddy()
{
     int flag=1;
     char buf[255];
     static struct scsi_cmd_parms open_door = {
          10, 1, 500,
          0xc4,
          0x01,
          0x00, 0x00, 0x00,0x00,0x00,0x00,0x00,
          0x00,
               };
     ioctl (fd,SIOC_CMD_MODE,&flag);
     ioctl (fd,SIOC_SET_CMD,&open_door);
     read (fd,buf,0xff);
}
```

Q: How does *fs_async* work? I thought that all UNIX filesystems used async writes to increase speed, but *fs_async* is set to zero on my system.

A: It has no effect on data writes, which are async (unless explictly made sync). The purpose of *fs_async* is to control the writing of file system meta data such as inodes and directories. To provide *fsck(1M)* with the best chance of fixing a file system, some of the writes are orchestrated. This means that when a block is freed from a file, that file's inode is updated synchronously so that there is no possibility that two inodes both think they own it.

Changing the value of *fs_async* affects whether the orchestration is maintained and will improve the performance of the filesystem. However, setting it to positive values can have a negative effect on *fsck(1M)'s* ability to restore a filesystem following a system failure. This translates into a high probability for losing files and directories if the system is shut down improperly.

The Series 700 use 4 values for *fs_async* (-1, 0, 1, and 2) while the Series 800 uses just 0 and 1:

-1 corresponds to the '0' value on Series 800 machines and is the safest setting for both machines.
0 makes some writes async on the 700, but is considered "safe."
1 makes a large number of unorchestrated writes on both systems.
2 makes almost every write asynchronous and exists on only 700s.

Other settings are undefined. For a stable machine, with power and user access protected, use of *fs_async* greater than 0 will improve filesystem performance, at the risk of extended data recovery after a failure.

Q: How can I set up *ftp* so users have access to files but not shells?

A: Here is how to set up *ftp* so that a group of users have only *ftp* access, all with their own individual passwords but all accessing the same set of files (i.e., the system thinks they are all really the same *ftp* user). With only a slight change, you can have a group of users who have only *ftp* access, all with their own individual passwords and access only to their own sets of files (this is left as an exercise for the reader).

1. Set up anonymous *ftp* (assumed in later instructions to be at */users/ftp*).
2. Add a user and group to */etc/passwd* and */etc/group*.
   For example, in */etc/passwd*:

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```
ftpuser:*:1000:1000:FTP User:/users/ftp:/bin/false
```

and in */etc/group*:

```
ftpgroup:*:1000:ftpuser
```

Note that *ftpuser* login is disabled (a "*" in the password field). This allows various utilities (such as *ls*) to recognize files that belong to an *ftp* user (particularly important for backups).

To give each *ftp* user his own private access, set up a unique disabled entry for each user.

3. In */users/ftp/etc*, you must have a group and passwd file, of the same format as their related system files. For example, in */users/ftp/etc/group* add:

```
ftpgroup:*:1000:
```

and in */users/ftp/etc/passwd* add:

```
ftpuser:*:1000:1000:FTP User:/users/ftp/ftpusers:/bin/false
```

Also, for each individual you want to allow access, add an additional entry. Note that these have passwords (see *passwd(1)* for instructions on setting passwords in this file):

```
george:3RgfBzfnipJPQ:1000:1000:George Smith \
FTP User):/users/ftp/ftpusers:/bin/false
```

A few things to notice. *ftpuser* is disabled. *george* has the same uid, gid, and home directory that *ftpuser* has. *george* will log in as "george" with his own password.

To give each *ftp* user his own private access, add an entry for each user that matches his */etc/passwd* entry.

4. Under */users/ftp*, create a directory "ftpusers." Make these directories with owner *ftpuser* and group *ftpgroup*, with 770 permissions. This effectively prevents anonymous *ftp* access to these directories, since it is not world readable/writable.

And that's it. Users access the system via anonymous:

```
$ ftp sysname
Connected to sysname.whatever.
220 sysname FTP server
Name (something:someuser): ftp
331 Guest login ok, send ident as password.
Password:
230 Guest login ok, access restrictions apply. Remote system type is UNIX.
Using binary mode to transfer files.
```

Continued on Page 14

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CIRCLE 85 ON READER SERVICE CARD

```
ftp> pwd
257 "/" is current directory.
```

Then, they use a sublogin to access their old files:

```
ftp> user george
331 Password required for george.
Password:
230 User george logged in.
ftp> pwd
257 "/users/ftp/ftpusers" is current directory.
ftp>
```

Users are placed in whatever directory is specified as their home directory in the */users/ftp/etc/passwd* file.

To remove access, remove their passwd entry from */users/ftp/etc/passwd.*

General HP-UX and 9000 questions are answered by Bill Hassell, a support engineer at the HP Atlanta Response Center. He can be contacted via e-mail at blh@hpuerca.atl.hp.com.

Workstations

Q: I have an HP 9000/745i running HP-UX 9.05 with SICL (Standard Instrument Control Library) Version C.03.02f. I am seeing a problem with some code I developed to control a module via the VXI backplane. I am using the *ipeek()*, *ipoke()*, and *imap()* functions. To verify my code I tried compiling some similar example code supplied with SICL (*/usr/pil/example/vxidev.c*). The code runs fine when I compile with the standard C compiler; however, if I compile the code with the C++ compiler, the code aborts with a core dump when run. The SICL documentation states that it can be used with C or C++. I followed the instructions in the manual on how to compile and link the SICL library routines, both as shared and archived libraries:

(shared library)

```
CC -o mycode mycode.c -lsicl
```

(archived library)

```
CC -o mycode mycode.c /usr/lib/libsicl.a -Wl,-E -ldld
```

Is the documentation correct that SICL can be used with C++ ? Am I using the right compile commands for C++?

A: Yes, SICL is supported with C++. Yes, you are using the correct commands to compile and link the code. I suspect that your difficulty is due to a problem in the C++ compiler. The problem is as follows. When you cast a pointer from a smaller size to a larger one and then dereference it, the C++ compiler does not generate an access of the larger size. Instead, it does multiple accesses of the smaller size and assembles the fragments together to produce a valid result. While this works for computer RAM, it does not work for hardware registers and, in particular, for many VXI devices that respond only to 16-bit accesses.

Thus the code:

```
*char ptr;

ptr = imap(...);
value = iwpeek(ptr + offset);
```

will do two 8-bit accesses, not one 16-bit access. Similarly, an *ilpeek* would do four 8-bit accesses.

The workaround is to assign the pointer to another pointer of the correct size before doing the *iwpeek* or *ilpeek*:

```
*char ptr;
unsigned short *ptr2;

ptr=imap();
ptr2=ptr + offset;

value=iwpeek(ptr2);
```

This will generate the correct code. Again, this is a C++ compiler problem, not a problem with SICL or the manual examples.

Q: I currently use an HP 9000/382 CPU running HP-UX 9.03 and BASIC/UX 6.3. Installed in the 382 is an HP 98622A GPIO interface. We use the

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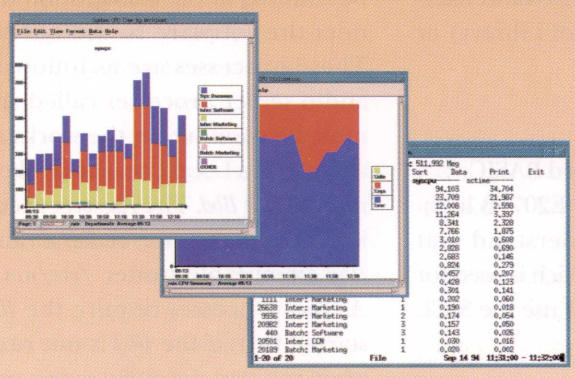

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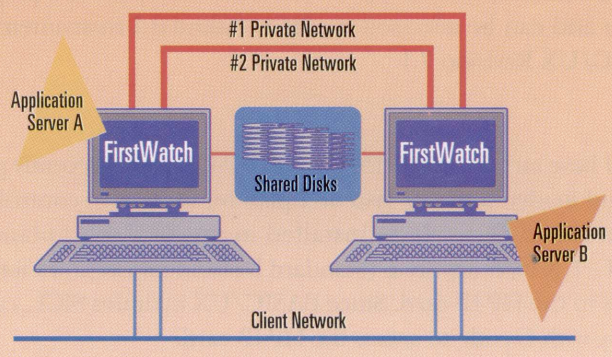

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CIRCLE 54 ON READER SERVICE CARD

GPIO interface to control a peripheral device developed in-house. We access the GPIO interface through BASIC/UX code that we developed to use the interface to control our device. We are thinking of migrating to an HP 9000 Series 700 CPU and I would like to know if there is a GPIO card available for the Series 700 platform, and will we be able to move our code to the Series 700 platform?

A: Yes, HP recently introduced a GPIO card for the Series 700 platform. The product number for the GPIO card is E2074A. The card plugs into the EISA backplane and can be accessed via SICL (Standard Instrument Control Library) or BASIC/UX Revision 7.1.

Q: I have an HP 9000/715 running HP-UX 9.05. I recently purchased BASIC/UX 7.1 and loaded it on my system. I plan on using it to control an HP E2071B high-speed HP-IB card I have installed in the EISA backplane. I understand that BASIC/UX includes SICL (Standard Instrument Control Library), which is used for access to the HP-IB card. Since BASIC/UX includes SICL, can I now use the SICL library with C code to access the HP-IB card?

A: No, BASIC/UX contains only the SICL run-time files. If you would like to do C-language SICL programming, you will need to purchase the SICL 3.02 product to be compatible with your BASIC/UX 7.1. You will also need the HP-UX 9.05 C Developer's Bundle.

Q: I just received my new HP 9000/712 computer. I loaded HP-UX 9.05 and brought the system up with no problems. I am now trying to get the audio working on the 712. I tried running the */usr/audio/bin/audio_editor* but it comes up with an error dialogue that says "Unable to access the audio hardware." I have checked the */dev* directory and I have the following device files:

```
crw--w--w-  1 root     sys     57 0x208000 Feb 17 11:32 /dev/audio
crw--w--w-  1 root     sys     57 0x208002 Jul 28 1994 /dev/audioBA
crw--w--w-  1 root     sys     57 0x208003 Jul 28 1994 /dev/audioBL
crw--w--w-  1 root     sys     57 0x208001 Jul 28 1994 /dev/audioBU
crw-rw-rw-  1 root     sys     57 0x208100 Jul 28 1994 /dev/audioCtl
crw--w--w-  1 root     sys     57 0x208012 Jul 28 1994 /dev/audioEA
crw--w--w-  1 root     sys     57 0x208013 Jul 28 1994 /dev/audioEL
crw--w--w-  1 root     sys     57 0x208011 Jul 28 1994 /dev/audioEU
crw--w--w-  1 root     sys     57 0x208022 Jul 28 1994 /dev/audioIA
crw--w--w-  1 root     sys     57 0x208023 Jul 28 1994 /dev/audioIL
crw--w--w-  1 root     sys     57 0x208021 Jul 28 1994 /dev/audioIU
```

Are these device files correct, do they have the right permissions, or is there another reason for the error?

A: Your device files are correct and they have the right permissions. I suspect that the reason you cannot run the *audio_editor* is because you have not completely configured the audio subsystem on your 712. The audio subsystem requires a couple of processes to be running in the background to connect the software to the hardware. These processes are as follows: Two audio server processes called *Aserver* must be running on the workstation, along with a Local Location Broker daemon called *llbd*. The *Aserver* executable is located under */usr/audio/bin* and the *llbd* executable under */etc/ncs*. The *Aserver* processes require the *llbd* be started first; if the *llbd* is not running when you start the audio server, you will get a message " Can't register server with *llbd*." To start the *llbd* and the *Aserver*, use the following steps:

1. Log in as superuser
2. Execute the command:

```
/etc/ncs/llbd
```

3. Verify the *llbd* started by executing:

```
ps -ef | grep llbd
```

4. If the *llbd* is running, execute the command:

```
/usr/audio/bin/Aserver
```

5. Verify that two *Aserver* processes were started by executing the command:

```
ps -ef | grep Aserver
```

You should now be able to run the *audio_editor* without error. To ensure

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these processes are restarted when the system is rebooted, edit the following files and make the suggested changes:

1. To make *llbd* start automatically at boot time edit the */etc/netncsrc* file and change the line

```
START_LLBD=0
```

to

```
START_LLBD=1
```

2. Create an */etc/audiorc* file containing these lines:

```
#!/bin/sh
if [ -x /usr/audio/bin/Aserver ]
then
    echo "Starting Aserver"
    /usr/audio/bin/Aserver
    exit 0
fi
```

3. Set the permissions on the */etc/audiorc* file to:

```
/etc/audiorc    -r-xr--r--    root    sys
```

4. Add the following section to the *localrc()* procedure in the */etc/rc* file:

```
localrc()
{
  .
  .
  .
  # Start up the audio server
  if [ -x /etc/audiorc ]
  then
    /etc/audiorc
  fi
}
```


Rudy Stanley is an applications support engineer with the Hewlett-Packard Response Center in Atlanta, Georgia. He can be reached via e-mail at: brst@hpuerca.atl.hp.com.

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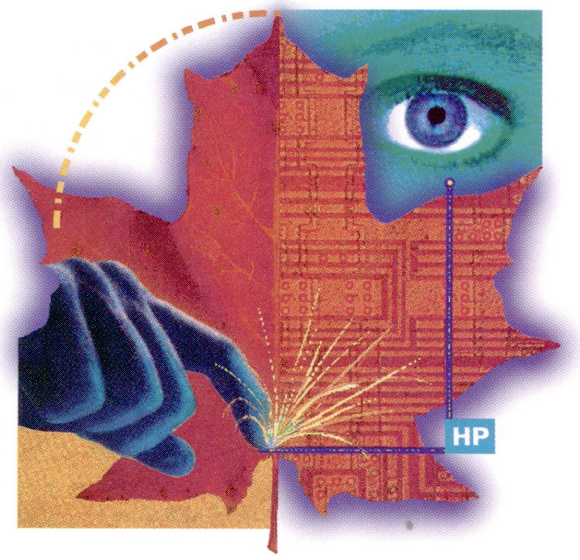

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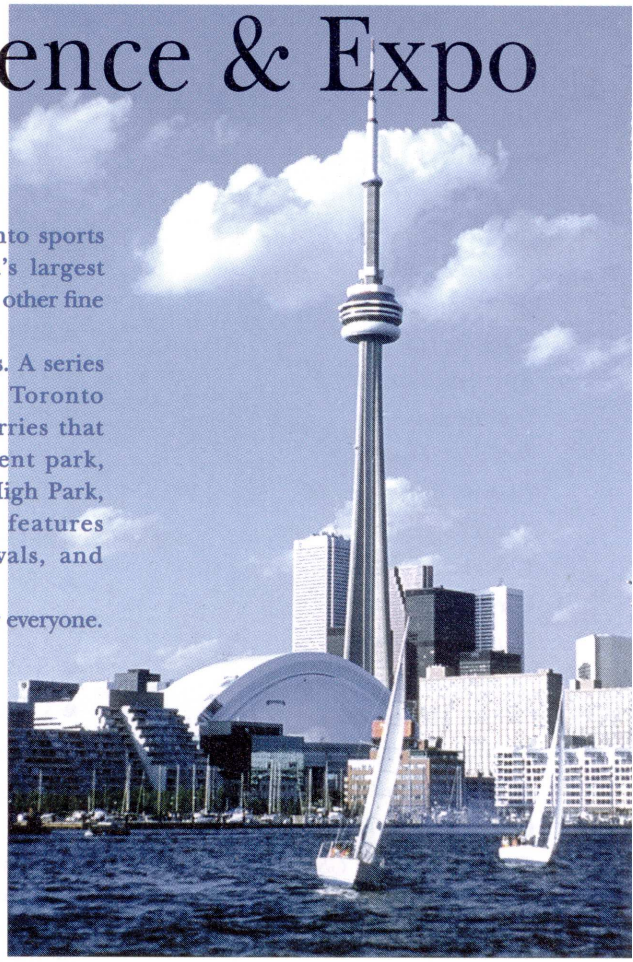
Harbourfront Centre, occupying 10 acres, is a cultural organization that produces and presents International Arts Festivals, marine activities, and a variety of children's events.

A shopper's paradise, Toronto sports elegant boutiques, the world's largest indoor antique market, as well as other fine establishments.

The city abounds with parks. A series of interconnected islands in Toronto Harbour are accessible by ferries that lead to beaches, an amusement park, and charming communities. High Park, Toronto's "Central Park," features hiking trails, outdoor festivals, and summer activities.

In short, there's something for everyone. See you in August!



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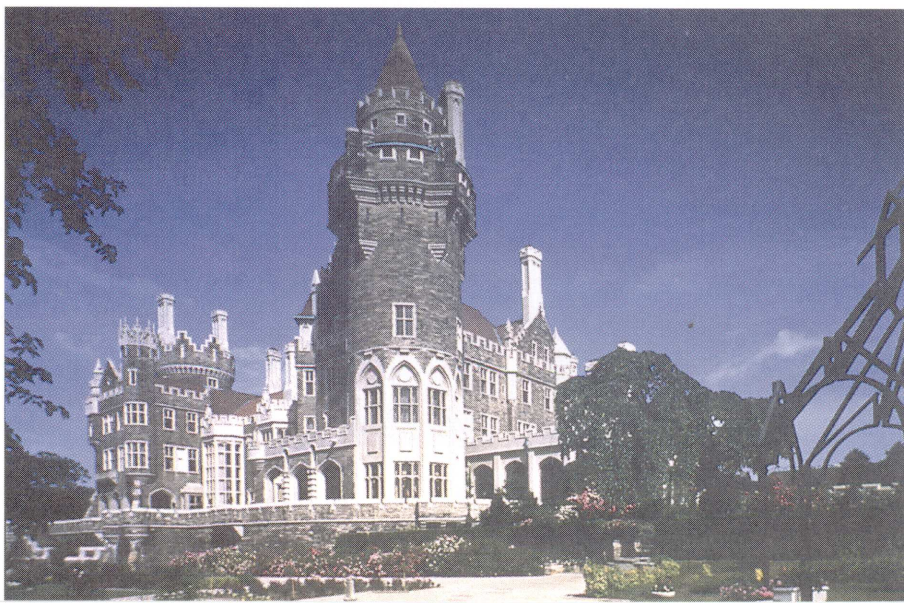

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Sun		☐
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Wang		☐
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Prime		☐
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NeXT		☐
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Other _____		☐

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Networking Background For System Administrators

Part 1

by Marty Poniatowski

Networking is the aspect of system administration that varies the most from installation to installation. Some installations, such as highly centralized and isolated systems that have only ASCII terminals connected to the system, require the system administrator to pay very little attention to networking. Other installations, such as highly distributed environments in which thousands of systems are connected to a network that may span many geographic sites, may require the system administrator to pay a great deal of attention to networking. In this scenario the amount of time a system administrator devotes to networking may exceed the amount of time spent on all other system administration functions combined! Rather than ignoring networking altogether, as the first system administrator might, or covering all aspects of network administration, as the second system administrator might, I will cover the aspects of network administration that most new system administrators care about. This is based on my experience working in a variety of new HP-UX installations. If you require more networking background than I provide, I would recommend as an excellent source of networking information *UNIX Networks*, by Bruce H. Hunter and Karen Bradford Hunter, Prentice Hall, ISBN 013-08987-1.

In this two-part article, I'll provide background and information on many networking topics, including the following:

Illustration By Nea Hanscomb

- general UNIX networking
- Internet Protocol (IP) addressing (classes A, B, and C)
- subnet mask
- ARPA services
- Berkeley commands
- host name mapping
- Network File System (NFS)
- HP-UX networking commands
- examples

UNIX Networking

Connecting to other machines is an important part of every HP-UX network. This means connecting both to other UNIX machines as well as to non-UNIX machines. The machines must be physically and functionally connected to one another so you can perform such tasks as transferring files and logging in to other systems. Many commands on your HP-UX system provide you with the functionality to log in and transfer files between systems. These are known as the ARPA commands *telnet* and *ftp*.

The *telnet* command allows remote logins in a heterogeneous environment. From your HP-UX system, for instance, you can telnet to non-HP-UX systems and log in to them. After login on the remote system, you must have an understanding of the operating system running on that system. If you need to connect to a different computer only for the purpose of transferring files to and from the system, then you can use *ftp*. This command allows you to transfer files between any two systems without having an understanding of the operating system running on the remote system. You need only an understanding of the *ftp* commands to perform the file transfer. Both of these commands are covered in detail.

These commands are somewhat primitive compared to the commands that can be issued between UNIX systems. To UNIX systems, networking is not an afterthought that needs to be added on to the system. The *ftp* and *telnet* commands come with your HP-UX system, as do more advanced commands and functionality that you can use to communicate between your HP-UX system and other UNIX systems. These more advanced commands, known as Berkeley commands, allow you to perform many functions remotely, e.g., copying files and directories and logging in. This functionality continues to increase to the point that you are working with files that can be stored on any system on the network and your access to these files is transparent to you with the Network File System (NFS).

Before I cover these commands, let's take a look at some networking background.

What Is All This Ethernet, IEEE 802.3, TCP/IP Stuff Anyway?

To understand how the networking on your HP-UX system works, you first must understand the components of your network that exist on your HP-UX system. There are seven layers of network functionality on your HP-UX system, as shown in *Figure 1*. I'll cover the bottom four layers in a cursory manner so you can see how each plays a part in the operation of your network and therefore be more informed when you configure and troubleshoot networking on your HP-UX system. The top layers are the ones that most HP-UX system administrators spend time working with because they are closest to the functionality you can relate to. The bottom layers are, however, also important to understand at some level so you can perform any configuration necessary to improve the network performance of your system, which will have a major impact on the overall performance of your system.

I'll start reviewing the diagram in *Figure 1* at the bottom, with layer 1, and describe each of the four bottom layers. This is the International Standards Organization Open Systems Interconnection (ISO/OSI) model. It is helpful in visualizing how networking layers interact.

Physical Layer

The beginning is the physical interconnect between the systems on your network. Without the physical layer you couldn't communicate between systems and all of the great functionality you would like to implement would not be possible. The physical layer converts the data you wish to transmit to the analog signals that travel along the wire (I'll assume for now that whatever physical layer you have in place uses wires). The information travelling into a network interface is taken off the wire and prepared for use by the next layer.

FIGURE 1 *ISO/OSI Network Layer Functions*

Layer #	Layer Name	Data Form	Comments
7	Application		User applications here
6	Presentation		Applications prepared
5	Session		Applications prepared
4	Transport	Packet	Port to Port transportation handled by TCP
3	Network	Datagram	Internet Protocol ( ) handles routing by either going directly to the destination or default router.
2	Link	Frame	Data encapsulated in Ethernet or IEEE 802.3 with source and destination addresses
1	Physical		Physical connection between systems. Usually thinnet or twisted pair

FIGURE 2 *Ethernet Encapsulation*

destination address	6 bytes	address data is sent to
source address	6 bytes	address data is sent from
type	two bytes	this is the "length count" in 802.3
data	46-1500 bytes	38-1492 bytes for 802.3, the difference in these two data sizes (MTU) can be seen with the **ifconfig** command
crc	4 bytes	checksum to detect errors

Link Layer

In order to connect to other systems local to your system, you use the link layer, which is able to establish a connection to all the other systems on your local segment. This is the layer where you have either IEEE 802.3 or Ethernet. Your HP-UX system supports both of these "encapsulation" methods. This is called encapsulation because your data is put in one of these two forms (either IEEE 802.3 or Ethernet). Data is transferred at the link layer in frames (just another name for data) with the source and destination addresses and some other information attached. You might think that because there are two different encapsulation methods, they must be very different. This, however, is not the case. IEEE 802.3 and Ethernet are nearly identical. This is the reason your HP-UX system can handle both types of encapsulation. So, with the bottom two layers you have a physical connection between your systems and data that is encapsulated into one of two formats with a source and destination address attached. *Figure 2* is a list of components of an Ethernet encapsulation, with comments about IEEE 802.3 encapsulation where appropriate.

Note that IEEE 802.3 and Ethernet have different maximum data sizes of 1492 and 1500 bytes, respectively. This is the Maximum Transfer Unit (MTU). The *ifconfig* command covered shortly displays the MTU for your interface. The data in Ethernet is called a *frame* (the re-encapsulation of data at the next layer up is called a *datagram* in IP, and encapsulation at two levels up is called a *packet* for TCP).

Keep in mind that Ethernet and IEEE 802.3 will run on the same physical connection, but there are indeed differences between the two encapsulation methods. With your HP-UX systems you won't have to spend much, if any, time setting up your network interface for encapsulation.

Network Layer

Next we work up to the third layer, which is the network layer. This layer on UNIX systems is synonymous with Internet Protocol (IP). Data at this layer are called *datagrams*. This is the layer that handles the routing of data around the network. Data that gets routed with IP sometimes encounters an error of some type, which is reported back to the source system with an Internet Control Message Protocol (ICMP) message. We will see some ICMP messages shortly, as well as *ifconfig* and *netstat*, two HP-UX commands used to configure this routing.

Unfortunately, the information IP uses does not conveniently fit inside an Ethernet frame, so you end up with fragmented data. This is really re-encapsulation of the data so you end up with a lot of inefficiency as you work your way up the layers.

IP handles routing in a simple fashion. If data is sent to a destination connected directly to your system, then the data is sent directly to that system. If, on the other hand, the destination is not connected directly to your system, the data is sent to the default router. The default router then has the responsibility of getting the data to its destination. This routing can be a little tricky to understand so I'll cover it in some detail shortly.

Transport Layer

This layer can be viewed as one level up from the network layer because it communicates with ports. TCP is the most common protocol found at this level and it forms packets

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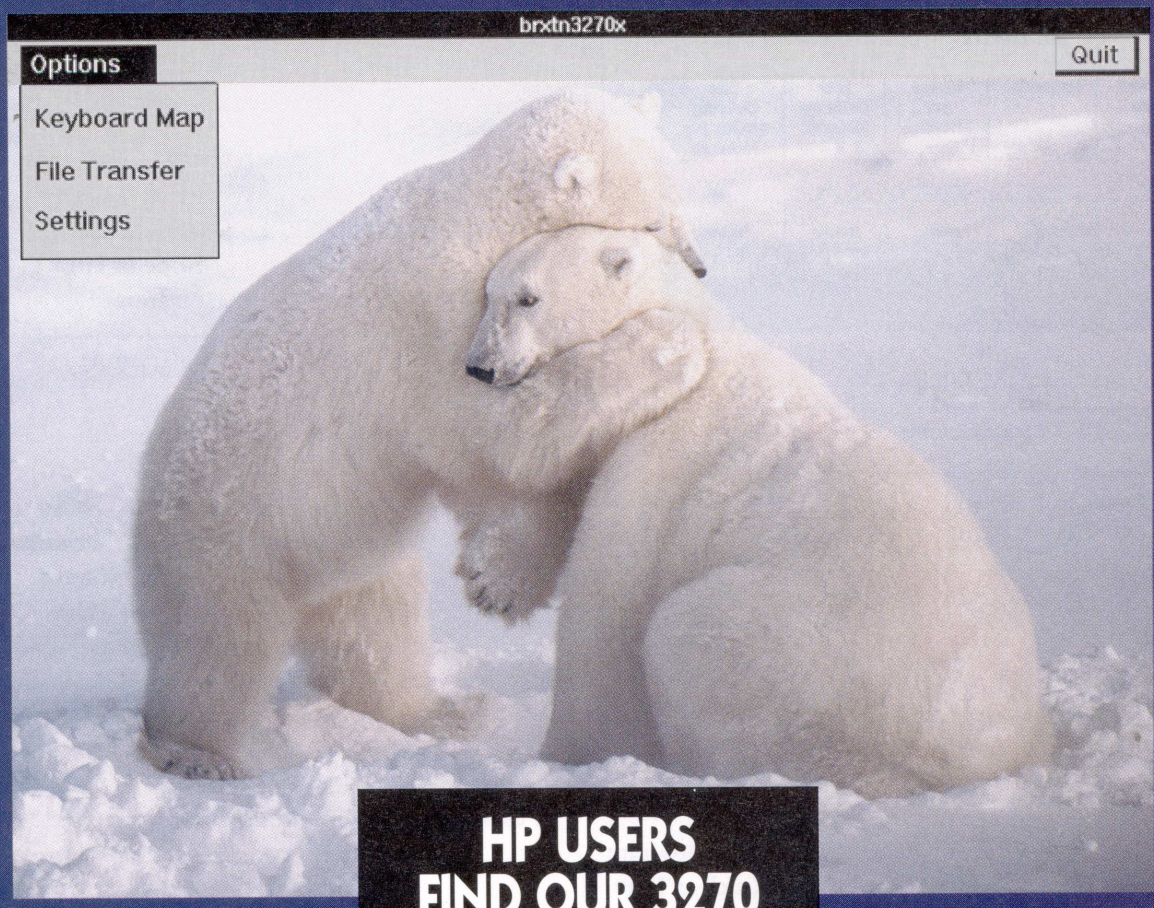

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FIGURE 3 *Comparison of Internet Protocol (IP) Addresses*

Address Class	Networks	Nodes per Network	Bits Defining Network	Bits Defining Nodes per Network
A	a few	the most	8 bits	24 bits
B	many	many	16 bits	16 bits
C	the most	a few	24 bits	8 bits
Reserved	--	--	--	--

FIGURE 4 *Address Classes*

Address Class	Networks Supported	Nodes per Network	Address Range		
A	127	16777215	0.0.0.1	-	127.255.255.254
B	16383	65535	128.0.0.1	-	191.255.255.254
C	2097157	255	192.0.0.1	-	223.255.254.254
Reserved	--	--	224.0.0.0	-	255.255.255.255

Looking at the 32-bit address in binary form, you can see how to determine the class of an address:

which are sent from port to port. The port used by a program is defined in */etc/services* along with the protocol (such as TCP). These ports are used by network programs such as *telnet*, *rlogin*, and *ftp*. You can see that these programs, associated with ports, are the highest level we have covered while analyzing the layer diagram. I will cover */etc/services* in more detail shortly.

Internet Protocol (IP) Addressing

The Internet Protocol address (IP address) is either a class "A," "B," or "C" address (there are also class "D" and "E" addresses I will not cover). A class A network supports many more nodes per network than either a class B or C network. IP addresses consist of four fields. The purpose of breaking down the IP address into four fields is to define a node (or host) address and a network address. *Figure 3* summarizes the relationships between the classes and addresses.

These bit patterns are significant in that the number of bits defines the ranges of networks and nodes in each class. For instance, a class A address uses 8 bits to define networks and a class C address uses 24 bits to define networks. A class A address therefore supports fewer networks than a class C address. A class A address, however, supports many more nodes per network than a class C address. Taking these relationships one step further, we can now view the specific parameters associated with these address classes in *Figure 4*.

Looking at the 32-bit address in binary form, you can see how to determine the class of an address as shown below:

```
class A  0uuuuuuu.........................................
         Network              Node or Host
         Address              Address
         |--------|-------------------------|
           1 byte              3 bytes

         net.host.host.host
```

A class A address has the first bit set to 0. You can see how so many nodes per network can be supported with all of the bits devoted to the node or host address. The first bit of a class A address is 0 and the remaining 7 bits of the network portion are used to define the network. There are then a total of three bytes devoted to defining the nodes with a network.

```
class B  10uuuuuuuuuuuuuu.........................
             Network      Node or Host
             Address      Address
         |-------------|-------------|
             2 bytes       2 bytes
         net.net.host.host
```

A class B address has the first bit set to 1 and the second bit to 0. There are more networks supported here than with a class A address, but fewer nodes per network. With a class B address two bytes are devoted to the network portion of the address and two bytes to the node portion of the address.

```
class C  110uuuuuuuuuuuuuuuuuuuuu...................
             Network              Node or Host
             Address              Address
         |-------------------|-------------|
             3 bytes              1 byte
         net.net.net.host
```

A class C address has the first bit and second bit set to 1 and the third bit is 0. The greatest number of networks and fewest number of nodes per network are associated with a class C address. With a class C address three bytes are devoted to the network and one byte to the nodes within a network.

Continued on Page 28

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FIGURE 5 *Example of Using Subnet Mask to Compare Addresses*

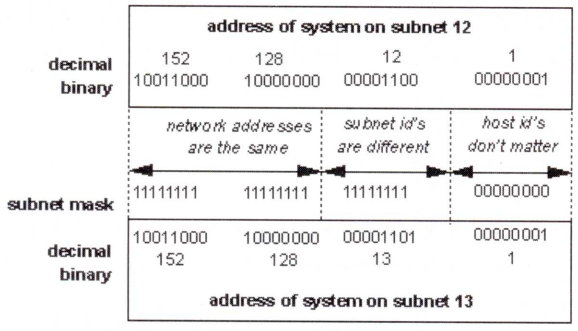


FIGURE 6 *Class B Systems on Different Subnets*

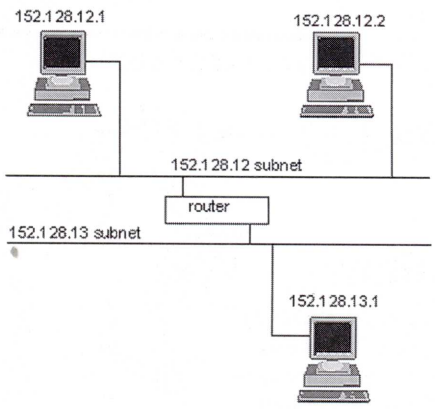
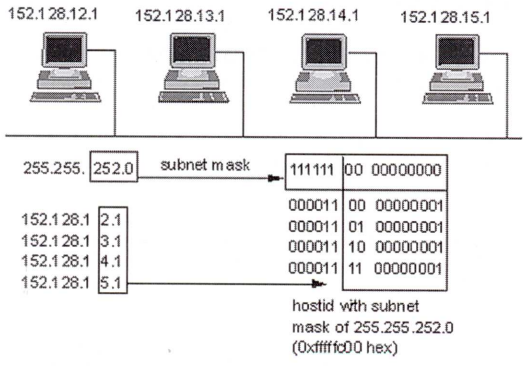


FIGURE 7 *Future Expandability Using Subnet Mask*



Subnet Mask

Your HP-UX system uses the subnet mask to determine if an IP datagram is for a host on its own subnet, a host on a different subnet but the same network, or a host on a different network. Using subnets, you can have some hosts on one subnet and other hosts on a different subnet. The subnets can be separated by routers or other networking electronics that connect the subnets.

In order to perform routing, the only parts of an address your router uses are the net and subnet. The subnet mask is used to mask the host part of the address. Because you can set up network addresses in such a way that you are the only one who knows which parts of the address are the host, subnet, and network, you use the subnet mask to make your system aware of which bits of your IP address are for the host and which for the subnet.

In its simplest form, what you are really doing with subnet masking is indicating which portion of your IP address defines the host, and which part defines the network. One of the most confusing aspects of working with subnet masks is that most books will show the following subnet masks as the most common:

Address Class	Decimal	Hex
A	255.0.0.0	0xff000000
B	255.255.0.0	0xffff0000
C	255.255.255.0	0xffffff00

This, however, assumes you are devoting as many bits as possible to the network and as many bits as possible to the host and no subnets are used. Let's take a look at an example of using subnetting with a class B address.

Address Class	class B		
host IP address	152.128.	12.	1
breakdown	network	subnet	hostid
number of bits	16 bits	8 bits	8 bits
subnet mask in decimal	255.255.	255.	0
subnet mask in hexadecimal	0xffffff00		
Example of different host on same subnet	152.128.	12.	2
Example of host on different subnet	152.128.	13.	1

In this example the first two bytes of the subnet mask (255.255) define the network, the third byte (255) defines the subnet, and

the fourth byte (0) is devoted to the hostid. Although this subnet mask for a class B address did not appear in the earlier default subnet mask table, the subnet mask of 255.255.255.0 is widely used in class B networks to support subnetting.

How does your HP-UX system perform the comparison using the subnet mask of 255.255.255.0 to determine that 152.128.12.1 and 152.128.13.1 are on different subnets? *Figure 5* shows this comparison.

The diagram in *Figure 6* shows these two systems on the different subnets. You don't have to use the 8-bit boundaries to delineate the network, subnet, and hostid fields. If, for instance, you wanted to use part of the subnet field for the hostid, you could do so. A good reason for this would be to accommodate future expandability. You might want subnets 12, 13, 14, and 15 to be part of the same subnet today and make these into separate subnets in the future. The example in *Figure 7* shows this.

These systems are connected to the same subnet even though part of the third byte, normally associated with the subnet, is used for the hostid. In the future, the subnet mask could be changed to 255.255.255.0 and have four separate subnets of 12, 13, 14, 15. This would require putting routers in place to route to these separate subnets.

To be continued in the next issue. ◧

Marty Poniatowski is a technical consultant with Hewlett-Packard. He is author of The HP-UX System Administrator's "How To" Book, *published by Prentice Hall, which can be ordered by calling (203) 377-4746.*

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CIRCLE 105 ON READER SERVICE CARD

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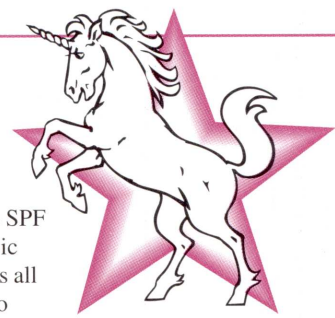

If you are familiar with HP's Edit/3000 or IBM's SPF editor, you already know how to use Qedit's basic editing commands. Qedit's full-screen mode uses all the functions of your HP terminal or emulator, so there are no complex and error-prone key sequences to learn.

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CIRCLE 4 ON READER SERVICE CARD

Product Review

by Greg Cagle

Z-Mail

At-a-Glance

Z-Mail 3.0.1

Network Computing Devices
Z-Code Software Division
101 Rowland Way #300
Novato, CA 94945
Phone: (415) 898-8649
Fax: (415) 898-8299
e-mail: info@z-code.com
Web: http://www.ncd.com/zcode.html

Price

$165/seat for 1 to 5 users
Evaluation kits are available for $50.

IN TODAY'S WORKPLACE, ELECTRONIC mail is critical to productivity. Many UNIX mail systems are now being designed in two parts: the MTA (Mail Transport Agent) and MUA (Mail User Agent). On UNIX systems, the MTA is generally a combination of the standard UNIX *sendmail* daemon and SMTP (Simple Mail Transport Protocol). SMTP is the default transport agent for the Internet.

The choice of an MUA for UNIX platforms can be complex. Historically, UNIX users have used public domain software, such as *mail, mailx, mh, mush,* and *elm.* These packages either have line-oriented interfaces or use the curses package to manage a menuing interface. The proliferation of X11 workstations and X terminals and the example of Sun's mailtool under OpenWindows made X/Motif point-and-click interfaces popular, and it was only a matter of time until a commercial X/Motif MUA for UNIX platforms appeared. One of the currently popular X/Motif MUAs is Z-Mail, from Z-Code Software, a division of NCD, Inc. Not surprisingly, it is shipped with NCD X terminals, and a version is also bundled with SGI workstations. Additionally, it is available for most popular UNIX platforms, as well as Windows and the Macintosh (using POP-3 or Z-POP). The version reviewed for this article is Z-Mail 3.0.1, running on an HP 735 at HP-UX 9.05 and HP-VUE 3.0.

Features

X/Motif Interface

The user interface provided by Z-Mail is intuitive and a good example of Motif style. The main window (*Figure 1*) displays a menu bar and the following optional areas: a folder status line, a folder selection panel, a message summary list, a button panel, an output log, and a command input area. The menu bar and the button panel can be customized. Double clicking on a message summary brings up the referenced message in a display window (*Figure 2*), which itself has a fully customizable menu bar and button panel. One limitation is that you can't display more than one folder at a time, or at least I couldn't find a way to do it. You can have more than one folder open, but only one displayed in the main window. Another feature I found mildly (but not seriously) annoying is the use of a scrollable list for address input. The composition window (*Figure 3*) uses the scrollable list in the upper right corner for input into both the To: and CC: fields; when either field is selected, Z-Mail parses the address list into the scrollable list window. I found that when I wanted to edit an address in the To: list, for example, I had first to select the To: field, then scroll the list to the entry I wanted, select it, and then press the Edit button, which brought the entry into the To: field for editing. Seems like a lot of work.

Full MIME Capability

Z-Mail fully supports multimedia mail with MIME. The key here is whether other MUAs that support MIME can successfully exchange MIME messages with Z-Mail. I was able to compose and receive MIME messages (containing image and sound components) with ishmail, dtmail, and HP's Mpower enhanced elm successfully. MIME decoding and encoding is controlled by a file in the main Z-Mail directory called *attach.types.* You can make user-specific customizations to this file if you want. For example, I customized it to use *imageview* instead of *xv* to display JPEG files.

Continued on Page 32

CHANGE OF PLANS !

Change to Plan-B for host-based client/server PC network backup

	Plan-A (THE OLD WAY)	PLAN B
Completeness	"We only back up our PC servers. We don't worry about data on users' PCs."	"Plan-B backs up all our PCs and PC servers, or whichever PCs we specify."
Automation	"Users perform their own backups. We give each one a box of floppy disks and they come to us when they need more."	"We used Plan-B's scheduler to automatically back up our PCs to our HP9000's DDS drive at night."
Convenience	"We have someone who comes in at night and carries a Trakker to each PC and backs them up one-by-one during the night. Users fill out a form if they need a file restored, and our night person restores the file."	"Plan-B backups are done with no user or operator intervention. The PC data is written to tape as part of our HP9000 backup. Users have a program on their PCs which they use to restore any file, any time, in seconds."
Control	"Users are supposed to back up their own PCs. We tell them to put important files on the file server anyway."	"Plan-B meets our auditor's requirements for ensuring that all corporate data is safeguarded."
Integrity	"We are not concerned about data consistency between PCs and the HP9000. Our client/server applications have not been implemented yet."	"Plan-B is the only backup package we found that supports our client/server environment, in which interrelated data is contained on PCs and the HP9000."
Security	"Users keep their backup diskettes in their desk drawers."	"With Plan-B, our PC backups are as reliable and secure as our HP9000 backups."
Performance	"PCs with large disk drives can take a very long time. We tried doing a PC network-based backup but it was way too slow."	"Plan-B's speed blows everything else away, since it uses the horsepower of our HP9000 system and backs up multiple PCs concurrently."

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fax 34 65 54 101	fax 40 25 16 52	fax 30 852 70 35	fax 2 33 41 23 33	fax 0 638 445	fax 372 360305	fax 227-6867

CIRCLE 26 ON READER SERVICE CARD

FIGURE 1 *Main Window*

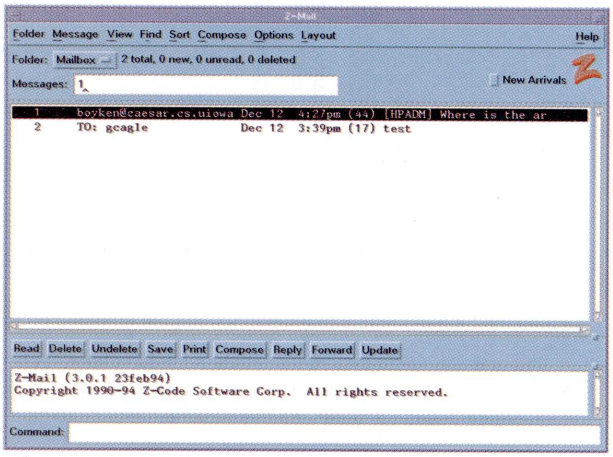


FIGURE 2 *Message Display Window*

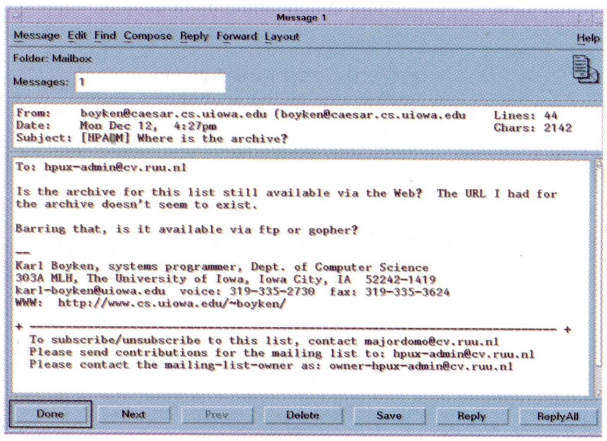


FIGURE 3 *Composition Window*

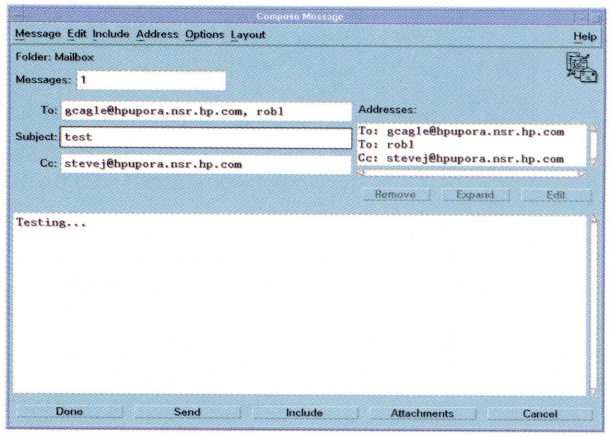


FIGURE 4 *Options Menu*

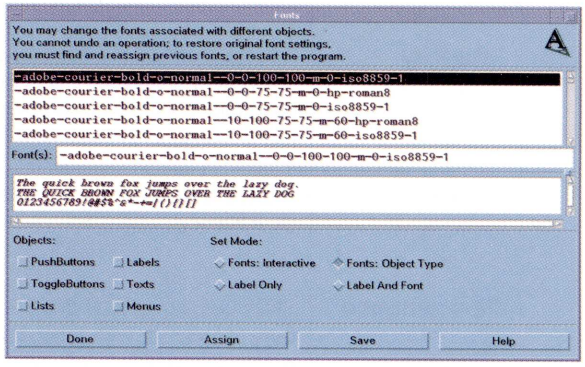
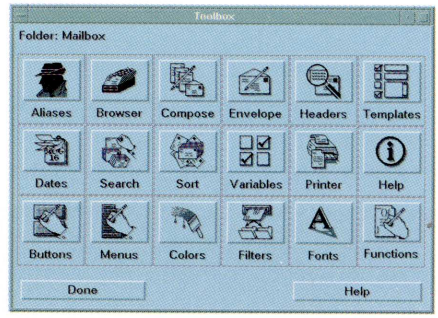


FIGURE 5 *Toolbox*



Extensive Customization Capability

You can spend a lot of time customizing Z-Mail. Almost anything you would want to do is available from the Options menu, including color and font customization (*Figure 4*). You can easily add, delete, or modify buttons from the main window button bar as well as the compose and message window button bars. All menus are completely customizable from a dialogue box. Scripts and functions can also be implemented from the Options menu. Runtime behavior of the program is controlled by numerous startup variables; these

are editable and savable across sessions from the Variables dialogue box. One example of this is the variable "presign," which causes a defined signature file to be preloaded into the composition window, instead of just appending the file when the message is sent.

The customization functions are also collected in the Toolbox (*Figure 5*) for easy access; this is convenient if you frequently change customization settings.

Scripting Capability

Z-Mail supports a mail scripting language called Z-Script. It allows power users to create their own functions (which can then be tied to a menu pick or button). An example of a trivial function:

```
ask -input patchno "Enter patch number"
if $status == -1
 return
endif
sh echo "send $patchno" >> $tmpdir/patch$$
mail -s $patchno -H $tmpdir/patch$$ -u -l -U support@support.mayfield.hp.com
sh rm $tmpdir/patch$$
```

The purpose of this function is to generate a mail message to the HP SupportLine mail server to order a patch via e-mail. The function can then be tied to a button on the front panel, for example. The function asks for the patch number, which is stored in a variable ("patchno"). It creates a temporary file with the text required to get the mail server to send the patch requested and then mails the file to the proper address using the "mail" script command.

Flexible Searching and Sorting

Sorting is supported on date, subject, author, message length, priority, and status. You can also customize and combine the sort parameters. Searching is supported by subject, author, message ID, priority, and mark by default. Very flexible pattern and date searches are also available, with optional actions to be performed on matches. Z-Mail also allows you to assign priorities to messages and sort them accordingly. One limitation is that you can't search multiple folders or trees of folders.

Filtering

Z-Mail provides filtering capabilities that allow automatic functions to be performed based on user-defined criteria. Examples include autoforwarding of certain messages, or autodeletion of junk mail. It's a matter of a few button clicks to set up a filter to autosave all mail from a certain person to a particular folder, for example.

Alias and Address Management

Z-Mail manages aliases as you might expect in a fairly obvious one-to-one correspondence. It also provides the concept of an address book, which supports flat file searches, NIS searches, X.500, or the output of a custom program. The address browser allows customizable searches of the address book, as well as automatic address checking of the message composition address fields. One of the default actions is to search *~/.addresses*; it was trivial for me to link that file to our site alias file and quickly enable that as an address book.

Online Context-Sensitive Help with Hypertext

Z-Mail supplies extensive online help with hypertext. It appears to fully supplant the hardcopy documentation, and I see no need to purchase the hardcopy manuals, especially since they don't have hypertext.

Floating Licenses

Z-Mail uses NLS, the Network Licensing System to manage floating licenses within a network. Some level of thought should be applied to the setup and configuration of the license server and its role within the network architecture on site. At our site there are over a thousand licenses served from a single server. Note that Z-Mail does periodic license checks while the application is up.

Multiplatform Support

The 3.0.1 CD distribution contains Z-Mail for the following platforms:

IBM RS/6000 AIX 3.2.2
IBM RS/6000 AIX 3.2.5
HP 9000/s800 HP-UX
HP 9000/s700 HP-UX
Motorola 88K 88open
Motorola 88K R40
MIPS RISC/OS 4.52
80486 NCR 3300 SVR4.0
DEC Alpha OSF/1 V1.3
80386 SCO ODT 3.2
Sequent PTX 2.0
SGI R3000 IRIX 4.0

SGI R3000 IRIX 5.1
Sun Sparc Solaris 2.2
Sun Sparc Solaris 2.3
Sun Sparc Solaris 4.1
DEC MIPS Ultrix 4.2

The following additional platform versions are available via FTP:

HP Apollo Domain/OS
HP 9000/s300 HP-UX
80386 Interactive UNIX
Pyramid OSx (BSD/SVR3)
Pyramid DC/OSx (SVR4)
40386 UnixWare SVR4.2

There are also Mac and PC versions available using POP-3 or Z-POP; currently they have platform-specific user interfaces, but the next release should have a common user interface with the UNIX versions.

The bottom line here is that Z-Mail can be a good corporate e-mail solution in situations where supporting multiple platforms is important.

Installation

Installation is fairly typical in my experience for UNIX applications. Z-Mail is distributed on a CD-ROM (and other media), which contains all UNIX versions of Z-Mail and PostScript versions of the three manuals, as well as a plain text version of the installation manual. Z-Mail is also available as a compressed tar file via FTP from *ftp://ftp.ora.com/pub/z-code/zmail/3.0.* An installation shell script is provided. On disk space usage is just under 8 MB for the standard installation. I did not perform the license server installation and configuration. Note that Z-Mail is statically linked and thus is not dependent on X11 or Motif shared libraries that may change. Z-Mail likes to be installed in */usr/lib/Zmail*, although that is configurable. Note also that in order to send mail, you must start *sendmail* using SAM if you have not already done so.

Usability

Z-Mail is very easy to use for both novice and power users. Additionally, the ease of customization is noteworthy. This is one of the few X/Motif applications I've seen where changing the colors and fonts on the fly is supported, if a little difficult to figure out.

Compatibility with other MUAs is everything that can be expected. Z-Mail supports the standard UNIX mail file format, and will read and convert mh folders if required. One minor issue arises with the usage of folder indices; Z-Mail uses them to speed up access to large folders. Unfortunately, other MUAs don't know about the indices, so if you switch back and forth, the indices can get out of sync with the folder.

Reliability and Performance

Z-Mail 3.0.1 has been absolutely reliable throughout the test period. Performance is as good as any MUA I've seen. The use of folder indices can speed things up significantly, at the risk of incompatibility with other MUAs as mentioned previously. Extremely large mail messages (upwards of 50,000 bytes) are displayed within three seconds on the tested configuration. Updates of large folders consisting of several hundred mail messages located on a local disk took two seconds on average. I have not seen a situation where Z-Mail's performance is in any way an issue.

Supportability

Z-Code supports Z-Mail with both e-mail and phone support for licensed customers for a 30-day period after purchase. After that point, customers can purchase annual support contracts covering phone, fax, and e-mail support plus free maintenance releases and half off new versions. Customers also can purchase "Premium Technical Support," which provides free new versions.

Hardcopy documentation consists of a *User Guide*, an *Installation Guide*, and a *Reference Manual.* Extensive online help is also available, and PostScript versions of the manuals are included on the CD-ROM distribution. O'Reilly also publishes a Z-Mail book.

Summary

I consider myself a mail power user; I send and receive a lot of e-mail and require a lot from an MUA. I've tried all the public domain packages there are and Z-Mail is clearly a cut above anything currently out there. I have also casually evaluated ishmail (from Hal Software) and dtmail, the multimedia mailer bundled with the November CDE snapshot. ishmail is quite close to Z-Mail in many areas but is less suited to power users, because it lacks scripting capabilities and other "power" features. dtmail is a viable alternative to either Z-Mail or ishmail, but also lacks power features and customization capabilities. And it's not a real supported product (yet). ◧

Greg Cagle is a technical consultant with HP's Professional Services Organization, specializing in HP-UX and workstations. In his spare time he is a member of the Board of Directors of InterWorks, the HP Workstation user group. He can be reached at (503)598-8205 or gcagle@hpupora.nsr.hp.com.

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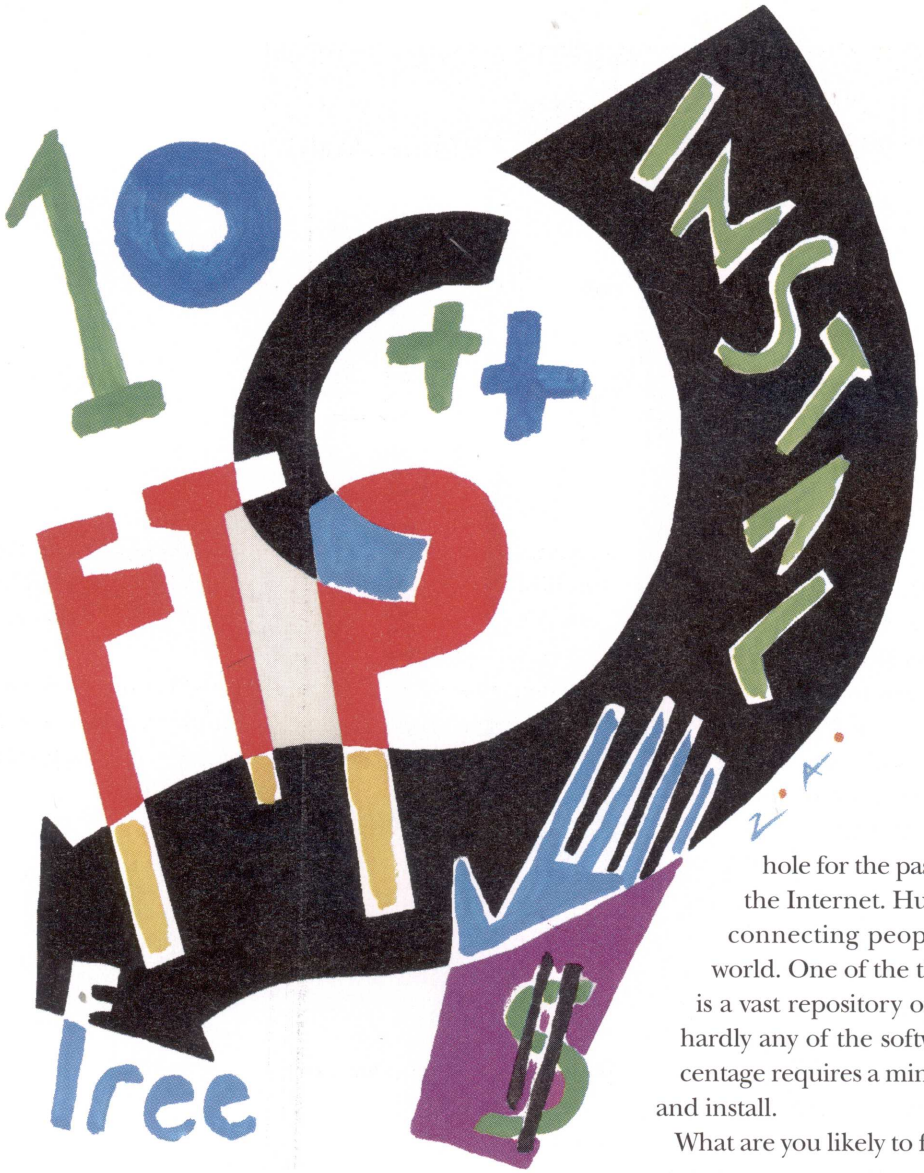

by Sean Reifschneider

Unless you've been living in a hole for the past year, you've probably heard about the Internet. Hundreds of thousands of computers connecting people at work and home all over the world. One of the things the Internet has evolved into is a vast repository of publicly available software. While hardly any of the software is "ready to run," a large percentage requires a minimal investment of time to compile and install.

What are you likely to find on the Net? Here's a sampling:

- nvi — A new version of the vi editor from Berkeley that includes unlimited undo/redo, multiple windows, and more.
- gzip — A non-patented replacement for the UNIX compress routines. Handles files with *.gz* extension that you're likely to find at many archive sites.
- ghostscript — An interpreter that takes PostScript input and produces native printer language output for various non-PostScript printers.
- GNUCC — A full C/C++/Objective C compiler. Very useful if you have the crippled compiler shipped with HP-UX.
- XV — An X image viewer supporting many file formats and image manipulation functions.
- XPilot — A multi-player network game. Warning: Severely addicting!

Building Programs from the INTERNET

The Starting Point

Most of the applications on the Net are written in ANSI C. All HP-UX machines come with a C compiler, but the standard compiler is included mainly to enable you to rebuild the HP-UX kernel. If you don't have access to the HP ANSI C compiler, there are still options. The Free Software Foundation's C (GNUCC) compiler will compile with the standard HP compiler, and a pre-built version is available for the Series 700 workstations (see FTP Sites list).

The next most important tool to have when building software from the InterNet is *gzip*. Archive sites often store their files compressed using either the UNIX *compress* utility (files with *.Z* extension) or with *gzip* (with *.gz* extension). You can find *gzip* at any GNU archive location (see FTP Sites list) and many other archive sites. Most software is distributed in a compressed tar file. Once it has been decompressed, you will need to de-archive it using *tar* (see the manual page for *tar(1)*).

This article can't cover how to build all available software, but at least general information on building and installing is included with the software. Look for files called *README* or *INSTALL*, which will probably have all but the most specific information on how to get the program running on your computer.

Doing the Build

Recently software has started being distributed with "Configure" scripts that can figure out what needs to be done to get the program to compile successfully. These scripts will search the computer to find libraries that need to be included and macros to define for the compiler. I have found that if there is a file named *Configure* in the top-level directory, more often than not I can get the package to compile without having to read the directions in *INSTALL* or *README*.

If you are trying to build a package that doesn't have automatic configuration, you will usually have to read the *README* or *INSTALL* documents. You may have to modify a header file or change flags in the *Makefile* to configure the software before doing a compile. This all should be discussed in *README* or *INSTALL* and will be different for every package.

Unlike most other vendors, HP's ANSI compiler defaults to using old-style (K&R) C and ANSI must be enabled with the *-Ae* flag. Most software assumes that *cc* runs as an ANSI compiler. You will need to find a line similar to

```
CC=cc
```

in the *Makefile* and change it to

```
CC=cc -Ae
```

for HP's ANSI compiler and

```
CC=gcc
```

for GCC.

Changing the definition of *CFLAGS* to

```
CFLAGS=+04
```

for HP's ANSI or

```
CFLAGS=-02
```

for GCC compilers will activate their maximum optimization modes. HP's compiler consumes *huge* amounts of memory with *+O4*, which may cause some compiles to run out of memory. Substituting *+O3* reduces the amount of memory used (by producing less optimal executables).

Once the configuration (automatic or manual) is complete, you are ready to type *make*. If all goes well, the end result

Illustration By Zita Asbaghi

will be an executable copy of the program. Some packages require that support files be installed in a known location (usually specified during the configuration step) and won't run until these have been installed. Usually, though, it is harmless to try the program once it's compiled.

Installing the New Software

Once the program has been compiled, the next step is usually to *install* the program so that users can access it. If you are building the program for your own use only, this may be as simple as copying it to your own *bin* directory.

If you plan on loading many packages, you will probably want to come up with a plan on where to load them. I use the directory */usr/local* as the tree to install all software I've built. Binaries go in */usr/local/bin*, libraries in */usr/local/lib*, etc. This prevents confusion with binaries that were shipped as a part of the OS.

It's very important on a multi-user system to ensure that this directory not introduce security holes into the system. My practice is to install all files and directories with an owner and group of *bin* and mode 755 for binaries and directories and 644 for other files.

Using the command *make install* will copy the program and any associated files into the directories chosen during the configuration stage. If the package doesn't have an install target in the *Makefile*, you'll again have to resort to reading the documentation that came with it. Most of the cases I've seen in which install support wasn't included were very simple programs that just required you to copy the binary into its final resting place.

What If It Doesn't Work?

The quality of software available is amazingly high considering that most of it is free. Sometimes you do get what you paid for, though—many packages don't work or core dump when you try to use them. Time spent on verifying that the configuration was done properly may turn up the problem. If it's a piece of software you really need to use, you might spend some effort on debugging it, or contact the author and see if there's any interest in working with him to fix any problems.

In the most extreme case, you will just remove the program. This is most easily done if you can verify that it doesn't work before you have completed the install. If the program is found to be unsuitable after the *make install*, you will need to find where it copied all the files so you can get rid of them. If at all possible, test *before* you complete the install.

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ftp.cae.wisc.edu	U.S. Mirror of University of Liverpool HP-UX Porting & Archive Centre
iworks.ecn.uiowa.edu	InterWorks HP User Group archive site

Licensing

It is your responsibility to find out what restrictions there are on use of the program. These should be detailed in one of the document files included with the software—often in a file called *COPYING* or *LICENSE*.

The single most used license is the GNU Public License, which is designed to guarantee that free software remains free. There are many different licenses that may restrict your use of the software to varying degrees. Be especially careful if you plan to use the software in a commercial environment—some software expressly restricts this.

X Window Software

X Window packages differ from others in that they usually have an *Imakefile* that describes what needs to be done to build a *Makefile*. The *Makefile* is generated using a tool called *imake*, which HP does not include. In fact, without the X developers kit, HP doesn't provide most of what you need to build X Window programs.

The libraries and headers needed to make X programs, as well as *imake*, are available from the InterWorks FTP site (see FTP Sites list). Setting up *imake* is non-trivial but can be accomplished with the assistance of the included *README* files.

In Closing

The current trend on the Internet seems to be towards higher and higher quality software that's as close to trivial to build as you can expect. There is a wealth of programs available out there that greatly extend the usefulness of HP-UX systems. A minimal investment of time in the short term can produce huge savings in the long term. ◧

Sean Reifschneider <jafo@Tummy.com> is currently working as an HP-UX Systems Administrator with experience in writing maintainable software in C, and far too many hours spent building software he's gotten from the Net.

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ad • vo • cate: to plead in favor of, *see support*

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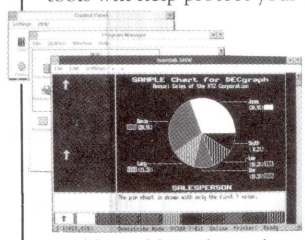

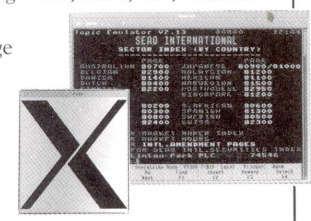

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CIRCLE 95 ON READER SERVICE CARD

Book Review

by Chris Curtin

THE SECOND EDITION OF the "Granddaddy" of all UNIX system administration books, *UNIX System Administration Handbook*, second edition, presents an easy-to-read, easy-to-understand, no-holds-barred approach to system administration. Unlike most other books in this category, the *Handbook* addresses many of the UNIX variants available today.

The book addresses six of the most common UNIX versions and points out the unique features of each as a topic is covered. The versions covered are Solaris 2.4, HP-UX 9.0, IRIX 5.2, SunOS 4.1.3, DEC's version of OSF/1 2.0, and BSD/OS 1.1. The authors take the occasional jab at others, such as SCO and IBM's AIX, but always in jest.

The first thing you'll notice when you receive the book is the CD-ROM. Rather than just writing about the limitations of the vendor-supplied programs or this great public domain program that you must have (which requires a direct Internet connection and several hours of FTP access to get), they include a CD-ROM packed with what the authors consider essentials for properly managing a system. After reviewing the list of programs included, I agree that you need them! I certainly did.

The book is divided into three sections: Basic Administration, Networking, and Bunch o' Stuff. The first section, Basic Administration, covers the basics of setting up and managing a UNIX system. Topics covered include starting the system, shutting it down, adding users, adding disks, controlling processes, developing a backup scheme, and reconfiguring the Kernel.

Title	*UNIX System Administration Handbook*, second edition
Author	Evi Nemeth, Garth Snyder, Scott Seebass, and Trent R. Hein
Publisher	Prentice Hall PTR 1995, 758 pages ISBN: 0-13-151-51-7 US $48

The second section, Networking, is worth the price of the book alone. The authors start with an overview of networking, protocols, and networking hardware. They do not assume that you are familiar with the jargon and acronyms. Additional sections cover NFS, DNS, SLIP/PPP, and sendmail. The last chapter in this section covers security and is required reading if you are thinking about connecting to the Internet. If you are already connected, read this section first!

The third section, Bunch o' Stuff, covers the remaining tasks an administrator must perform, as well as some areas you may not have thought about. A good section on a huge topic, Usenet News, gives a useful introduction to newsgroups and provides a starting point for the list of groups an administrator should read and be involved with.

Printing and Imaging is included in this section, but I think this topic belongs with Basic Administration. I know that I spend a fair amount of time fooling around with printers when getting a system set up. Other topics in this section address hardware maintenance, disk space maintenance, and the accounting system. Also included is a very good section on configuring and using UUCP.

The second to last chapter is one that I read with great interest: Daemons. The authors describe each of the major

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daemons that are part of a UNIX system. They divide the daemons into sections by function, so you can determine which ones you need to run, based on your configuration and requirements.

The last chapter in the book seemed out of place, considering the technical nature of the earlier sections. It is simply called Policy and Politics. The authors speak (write) their minds. This section presents several real-world situations that do not have a clear-cut right or wrong answer. Topics here address user and administrator policy agreements, legal issues, and tips on hiring and firing staff.

While most of the authors come from an academic environment and some of their suggestions are tailored to that environment, the issues they bring up made me think about what I would have done, if I were faced with the same situations. After reading the chapter, I was glad they included it.

Unlike many other books on this topic, the authors do not try to make System Administration seem easy or glamorous. After their introductions and overview of the book they launch into a section named System Administration under Duress.

In a few paragraphs they describe how 99 percent of administrators became administrators: You learned how to do something and soon everyone began relying on you to continue doing it. I know that's how I got started. Read section 1.6 for a very realistic look at our profession. The authors also include tips on how to get the recognition and hours necessary to perform this job, especially if administrator is not your primary responsibility.

Some general comments about the book: It is very easy to read. Lots of examples, specific comments about the different versions of UNIX, cute drawings, and a couple of sarcastic comments about AIX, MS-DOS, and the Macintosh.

My favorite quote from the book is on page 70 in a discussion of how new UNIX processes are created: "New processes are created by other processes, just like new humans." In a footnote they add, "New humans are normally created by other humans, not by UNIX processes."

Since the book covered multiple versions of UNIX, I paid particular attention to the sections about HP-UX. First, the book uses HP-UX on the Series 700, so some of what they describe does not apply to the Series 800. Also some of the subjects discussed are different on the Series 800 than as described. Check the HP-UX documentation to see how to perform a function on a Series 800. The authors also make a great effort to define where HP-UX 9.0 received some of its functionality. Some is from BSD, some from ATT UNIX, and a lot is homegrown. While not necessary to manage an HP-UX system, it is nice to know.

The authors do make a couple of incorrect comments about HP-UX. First they had problems executing programs when the operating system was shut down. On page 40 they state that you cannot get scripts in */etc/shutdown.d* to execute. Since they do not say which version of 9.0 they were running, I cannot say if this was a bug in an earlier version, but I know it works in 9.03 and 9.05.

They also take a swipe at HP's sendmail on page 458. They discovered one of the more annoying things about how HP wants you to perform system administration: SAM. They were unable to start HP's sendmail since it did not have the correct permissions and it could not find a *sendmail.cf file*. What they did not know is that SAM creates the *sendmail.cf file* and changes the permissions on the sendmail executable when you use SAM to configure and enable sendmail.

The sendmail example caused me to reread sections of the book to see how they were enabling and configuring the UNIX subsystems. In every case they were editing the configuration files by hand. Nowhere was there mention of SAM or its cousins in Solaris, OSF, or SunOS. While I agree that knowing what functions these automated interfaces perform with a press of a button, skipping over them makes the administration task look a lot more daunting than it is.

I highly recommend this book to all levels of System Administrators—especially with all the tools that are provided on the CD-ROM. You won't be disappointed. ◧

Chris Curtin, a software developer for Bradley Ward Systems, Inc. in Atlanta, Georgia, specializes in device driver development for factory automation on the HP 9000. He can be reached via e-mail at: chris@bwilab3.atl.ga.us.

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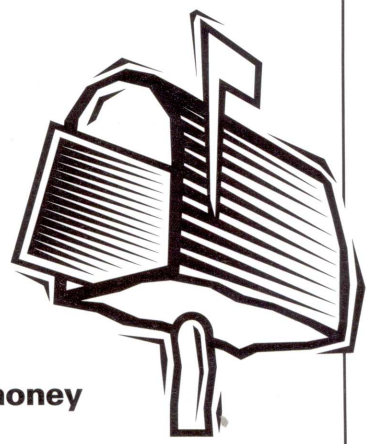

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Hardware Review

by Wendy L. King

DAA Modem Control MUX Panel for the HP 1000 A&F Series

THE PACKAGE WAS SMALL, the contents plain, and I could not install it fast enough. Ignoring the instructions, I powered off the HP Modem Card Cage on my A990, switched the 12040D MUX interface cable to the new DAA Full Modem Control Multiplexer Panel, and powered it up. For 24 hours I did nothing else. The 20 automatic phone calls to remote systems were completed without a murmur. I heard silence from users who call into my systems. The system console displayed no errors. This was absolutely the most seamless change of hardware I had ever seen.

It was difficult to contain my glee as I verified that all my data acquisition over the dial-up modems worked just as though the old HP Modem Card Cage was still installed. Next, I opened the small, simple manual, skipped over the gen and init stuff, and read the programmatic status and control instructions. It is a bit techie, but in minutes I was able to use the CO command to raise or lower DTR, and retrieve the status of one or all the MUX ports. Another few minutes, and I had written a program that successfully controlled the ports and reported their status using plain English.

A Little History

A900 users have been asking for a full modem control MUX panel for a very long time. It has been on every SIC RTE Ballot and would have been a top choice if improved LAN performance had not been a higher priority for most of us struggling to keep our HP 1000 systems "up to speed" in expanding LAN environments. Each year, shrinking HP resources have forced us to pick only one major enhancement.

The standard RS-232-C MUX panel for the A900 does not support full modem control because it has only pins 2, 3, and 7 (transmit, receive, and ground). The single-port 12005B ASI is not a true full duplex card (no XonXoff), has no FIFO buffer, and does not support user control of DTR. Until now, only the HP37214A Modem Card Cage (also known as the South Queensferry box) supported multiple, full modem control serial ports on a single interface without requiring that users provide their own microcode or driver.

However, the Queensferry price is, to quote a long-time RTE user, "a $10,000 solution to a $200 problem." It requires individual cards for each port and is simply too much equipment occupying too much real estate and costing too many dollars for one or two modem control port requirements.

HP removed the HP37214A Modem Card Cage from the corporate price list a few years ago, with nothing to replace it. When I needed full modem control for multiple ports on another A900 last year, I contacted six vendors before I found a used one. With the end of support life in sight, even a used one is not a good solution.

The HP12792 8-Channel Asynchronous Multiplexer for the HP 1000 F Series does not provide full modem control, but because the BACCI is an adequate alternative, its users have not expressed a burning desire for a full modem control MUX panel. So it is something of a bonus for them that the DAA 12854A also works with the HP12792 MUX, now offering multiple ports with full modem control capability on a single interface. I do not have an F Series computer to test it, but since the documentation makes no distinction, I assume the control and status commands

work equally on both systems.

The DAA 12854A MUX Panel

The 12854A multiplexer distribution panel, manufactured by Digital Automation Associates Incorporated, supersedes the discontinued A900 Series HP37214A Modem Card Cage, providing dialup modem support for the HP12040D and the F Series HP12792 8-channel Asynchronous Multiplexers. For dialup full duplex modem applications, the 12854A provides up to seven modem ports. Ports not required for modem control may be used for local terminal connections to the multiplexer, since the 12854A multiplexer can also function as an RS-232 8-channel multiplexer with no modem control.

The 12854A multiplexer distribution panel dimensions are 7 1/16" high × 9 1/4" wide × 7/8" deep (you can hold it in the palm of your hand). It has eight 25-pin female D-connectors, one 36-pin receptacle connector, and a power jack. All of the connectors and jacks are accessed through the front panel. *Figure 1* shows a drawing of the panel.

The 12854A assembly consists of front and rear steel panels and a printed circuit board. The 12854A distribution panel can be mounted on an optional 19-inch rack mount bracket. It mounts perfectly on the older rack mount bracket for the 36-pin HP12828A RS-232-C panel. It cannot be mounted on the rack mount bracket for the newer 50-pin HP28658-60005 RS-232-C panel because the screw holes do not line up. *Figure 2* shows a side view of the 12854A assembly with the optional 19-inch rack mount bracket.

An external power supply must be connected to the 12854A distribution panel. The power supply is a wall transformer that uses standard 110V AC 60 Hz input with an output of +5V DC (500 ma). The power plug of the wall transformer is connected to the power jack on the 12854A distribution panel.

If a Digital Automation 12828-60032 cable is purchased, the multiplexer is powered from the HP 1000. In this case, no external power supply is needed. The 12854A multiplexer must be fused differently for this feature; fusing is done by the vendor before a unit is shipped.

A 36-pin receptacle is located on the front of the 12854A distribution panel. The connector provides an interface to the computer. *Figure 3* describes the pin

FIGURE 1 *12854A Panel*

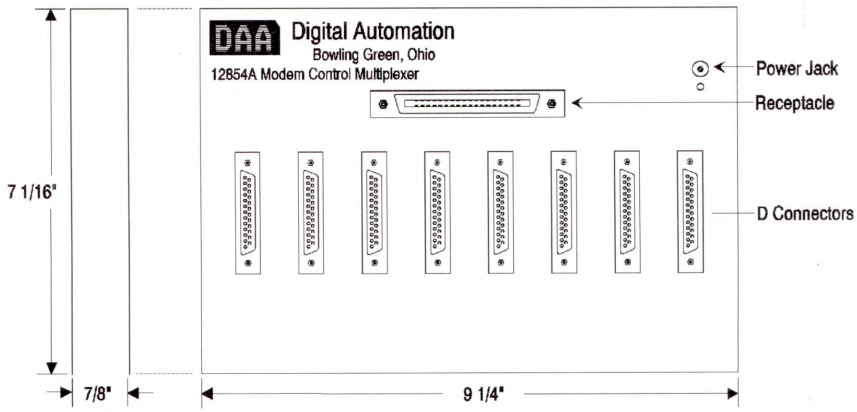

FIGURE 2 *Side view of 12854A*

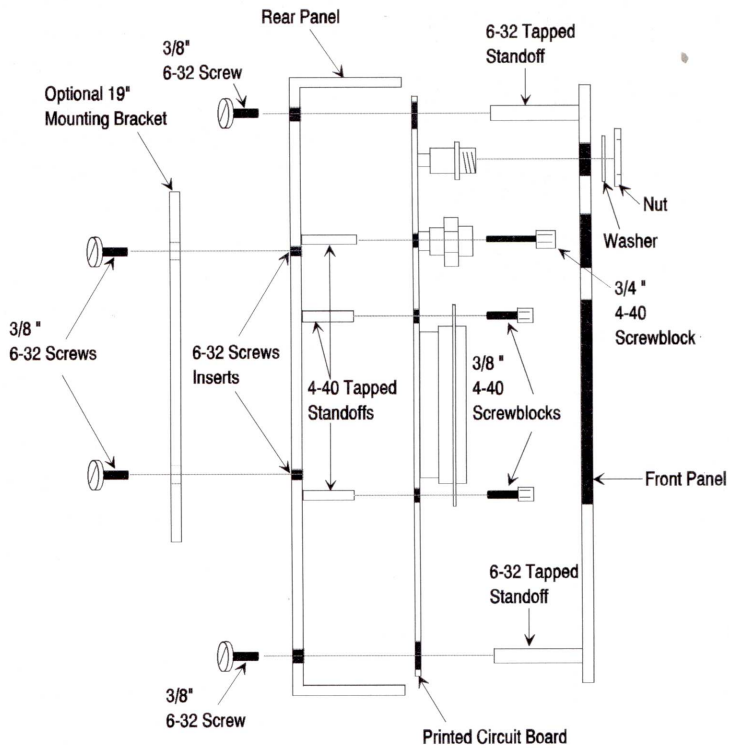

FIGURE 3 *36-pin receptacle*

Pin Number	Signal	Description
1	RD7+	Receive Data Common
2	SD7+	Send Data Common
3	RD6+	Receive Data Common
4	SD6+	Send Data Common
5	RD5+	Receive Data Common
6	SD5+	Send Data Common
7	RD4+	Receive Data Common
8	SD4+	Send Data Common
9	RD3+	Receive Data Common
10	SD3+	Send Data Common
11	RD2+	Receive Data Common
12	SD2+	Send Data Common
13	RD1+	Receive Data Common
14	SD1+	Send Data Common
15	RD0+	Receive Data Common
16	SD0+	Send Data Common
17	GND	Frame Ground
18	+5V	Optional Power from HP1000
19	RD7-	Receive Data
20	SD7-	Send Data
21	RD6-	Receive Data
22	SD6-	Send Data
23	RD5-	Receive Data
24	SD5-	Send Data
25	RD4-	Receive Data
26	SD4-	Send Data
27	RD3-	Receive Data
28	SD3-	Send Data
29	RD2-	Receive Data
30	SD2-	Send Data
31	RD1-	Receive Data
32	SD1-	Send Data
33	RD0-	Receive Data
34	SD0-	Send Data
35	------	No Connection
36	------	No Connection

FIGURE 4 *25-pin female D Connector*

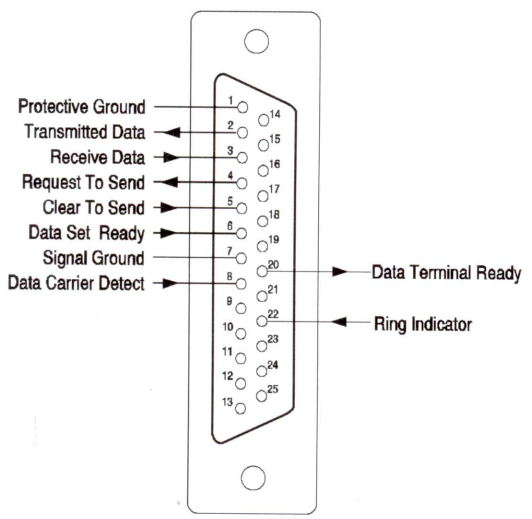

FIGURE 5 *1's AND 0's = Bits and Bytes: What They Mean*

```
Byte 1 = 0000 =  0 = @ = no RI
         0001 =  1 = A = RI (incoming call)

Byte 2 = 0000 =  0 = @ = no CTS or DSR or DCD
         0010 =  2 = B = CTS
         0100 =  4 = D = DSR
         0110 =  6 = F = CTS DSR
         1000 =  8 = H = DCD
         1010 = 10 = J = DCD CTS
         1100 = 12 = L = DCD DSR
         1110 = 14 = N = CTS DSR DCD

Byte 5 = 0000 =  0 = @ = no DTR
       = 0010 =  2 = B = DTR
```

assignment of the 36-pin receptacle. Users who replace a 50-pin HP panel with the DAA 12854A must purchase a new cable. I replaced a 36-pin HP panel using the cable I already had, and it worked fine. *Figure 4* presents the pin assignments of the 25-pin female D connector.

Backward Compatibility

Digital Automation Associates have really taken care of the HP Modem Card Cage installed base. The DAA Modem Control MUX Panel "feels" just like the old HP Modem Card Cage, and has been so well done that neither the 12040D MUX interface nor the RTE-A system sees any difference. The manual is easy to follow. I wrote a simple program to control DTR or retrieve port status on the DAA MUX panel. With no modification, this program works equally well with my HP Modem Card Cage. *Listing 1* contains the program listing, and *Figure 5* translates the status returned by the controller port from techie 1's and 0's to plain English. I tested and now use the panel on an A990 (upgrade from an A900) running RTE-A Revision 6.1 with 12040D MUX Revision 5.22 firmware.

Modem-Host Interaction

Incoming calls are handled by HPMDM, which is part of the RTE-A software product. It is scheduled by the driver to handle the mechanics of connection and disconnection with cleanup duties thrown in. The HPMDM interface with the DAA MUX Panel is flawlessly identical to that with the HP Modem Card Cage.

When a standard (Hayes-compatible) modem is being used for dialing out, the importance of the state of the host computer's DTR is relative to the significance the modem has been

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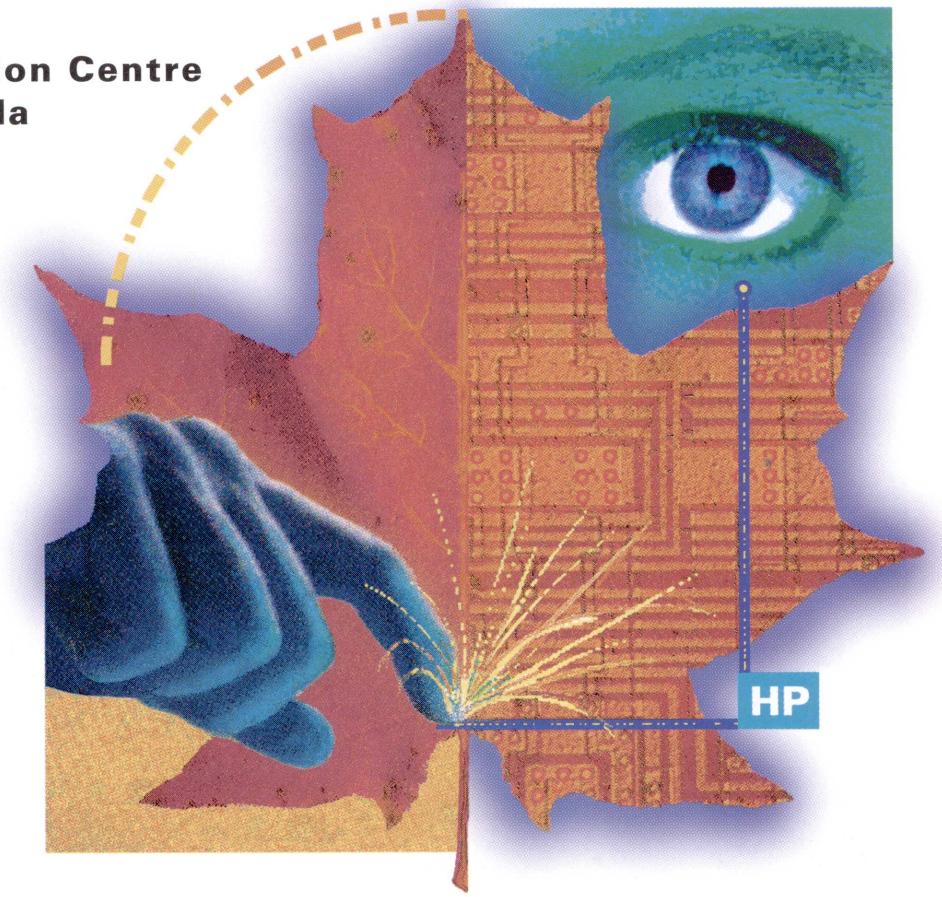

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LISTING 1 *DTR Status and Control Program*

```
ftn7x,l
      program DtrCntrl
      implicit none
      integer*2     CntlrLu  $parameter (CntlrLu  = 88) !customize for host
      integer*2     LastPort $parameter (LastPort =  6)
      integer*2     StdOut   $parameter (StdOut   =  1)
      integer*2     cntwd(2),i,j,PortNo
      integer*2     ibuf(4)
      character     cbuf*8
      equivalence (cbuf,ibuf)
      character*1  byte1,byte2,byte3,byte4,byte5,byte6
      equivalence (cbuf(3:3),Byte1)
      equivalence (cbuf(4:4),Byte2)
      equivalence (cbuf(5:5),Byte3)
      equivalence (cbuf(6:6),Byte4)
      equivalence (cbuf(7:7),Byte5)
      equivalence (cbuf(8:8),Byte6)
      character*20 Byte1Status(0: 1)
      character*20 Byte2Status(0:14)
      character*20 Byte5Status(0: 2)

      data Byte1Status( 0)  / 'RI          lo       ' /
      data Byte1Status( 1)  / 'RI          hi       ' /
      data Byte2Status( 0)  / 'CTS DSR DCD lo       ' /
      data Byte2Status( 2)  / 'CTS         hi       ' /
      data Byte2Status( 4)  / 'DSR         hi       ' /
      data Byte2Status( 6)  / 'CTS DSR     hi       ' /
      data Byte2Status( 8)  / 'DCD         hi       ' /
      data Byte2Status(10)  / 'DCD CTS     hi       ' /
      data Byte2Status(12)  / 'DCD DSR     hi       ' /
      data Byte2Status(14)  / 'CTS DSR DCD hi       ' /
      data Byte5Status( 0)  / 'DTR         lo       ' /
      data Byte5Status( 2)  / 'DTR         hi       ' /
*-----------------------------------------------------------------
*** initialize the I/O control word for exec calls with the
*** mux panel controller port 7 LU number.
      cntwd(1) = CntlrLu
      cntwd(2) =  0
*** request and display abreviated single byte status of all ports
      call charfill(cbuf,' ')
      write(cbuf,'(2(a))')'?',char(13)
      call xluex(2,cntwd,ibuf,-2)
      call charfill(cbuf,' ')
      call xluex(1,cntwd,ibuf,-7)
      write(StdOut,'(/x,a,a)')'Mux Status = ',cbuf(1:7)

      do i = 1,7
        j = i - 1
        if(cbuf(i:i).eq.'Z') then
          write(StdOut,*)'Port ',j,' Power-up reset'
        elseif(cbuf(i:i).eq.'N') then
```

Continued on Page 50

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CIRCLE 140 ON READER SERVICE CARD

LISTING 1 *DTR Status and Control Program, continued*

```
            write(StdOut,*)'Port ',j,' Unavailable:  DSR,DCD lo'
          elseif(cbuf(i:i).eq.'B') then
            write(StdOut,*)'Port ',j,' Being Called: RI hi'
          elseif(cbuf(i:i).eq.'H') then
            write(StdOut,*)'Port ',j,' Connect:      DTR,DSR,DCD hi'
          elseif(cbuf(i:i).eq.'D') then
             write(StdOut,*)'Port ',j,' Disconnected: DSR,DCD hi; DTR lo'
          endif
        enddo
*** Raise DTR on each port, request and display status
        write(StdOut,'(/a/)')' Raising DTR on all ports...'

        DO PortNo = 0,LastPort
          call charfill(cbuf,' ')
          write(cbuf,'(i1,2(a))')PortNo,'E',char(13)
          call xluex(2,cntwd,ibuf,-3)   ! send command to controller
          call exec(12,0,2,0,-2)        ! allow time for response
          call charfill(cbuf,' ')
          write(cbuf,'(i1,2(a))')PortNo,'Q',char(13)
          call xluex(2,cntwd,ibuf,-3)   ! ask for status
          call charfill(cbuf,' ')
          call xluex(1,cntwd,ibuf,-8)
          write(StdOut,'(a,i1,a)')' Port ',PortNo,': _'
          write(StdOut,*)cbuf
          write(StdOut,'(9x,a)')Byte5Status(iand(15,ichar(byte5)))
          write(StdOut,'(9x,a)')Byte2Status(iand(15,ichar(byte2)))
          write(StdOut,'(9x,a)')Byte1Status(iand(15,ichar(byte1)))
        ENDDO

*** Lower DTR on each port and report the status

        write(StdOut,'(/a/)')' Lowering DTR on all ports...'

        DO PortNo = 0,LastPort
          call charfill(cbuf,' ')
          write(cbuf,'(i1,2(a))')PortNo,'Y',char(13)
          call xluex(2,cntwd,ibuf,-3)   ! send command to controller
          call exec(12,0,2,0,-2)        ! allow time for response
          call charfill(cbuf,' ')
          write(cbuf,'(i1,2(a))')PortNo,'Q',char(13)
          call xluex(2,cntwd,ibuf,-3)   ! ask for status
          call charfill(cbuf,' ')
          call xluex(1,cntwd,ibuf,-8)
          write(StdOut,'(a,i1,a)')' Port ',PortNo,': _'
          write(StdOut,*)cbuf
          write(StdOut,'(9x,a)')Byte5Status(iand(15,ichar(byte5)))
          write(StdOut,'(9x,a)')Byte2Status(iand(15,ichar(byte2)))
          write(StdOut,'(9x,a)')Byte1Status(iand(15,ichar(byte1)))
        ENDDO

        end
```

told to give it. Most Hayes-compatible modems can be set up to do one of the following:

1. Ignore DTR—Connect incoming calls and respond to host commands regardless of whether DTR is high or low, and do not disconnect in the event of a DTR transition.
2. DTR Controls Only Disconnects—Connect incoming calls regardless of DTR state, but disconnect on transition from high to low.
3. DTR Controls—Connect incoming calls and respond to host commands only if DTR is high, and disconnect on transition from high to low.

It is possible for the A900 to be so busy that it misses the ring indicator for one or more rings. If the modem is set up for DTR to be ignored, or to control only disconnects, then the modem will establish a connection to the calling modem as soon as the prescribed number of rings has been received. If that number is one, then the modem may establish the connection before the MUX driver has "seen" the ring and scheduled HPMDM. In this case the caller gets the message that the modems are connected, but no login prompt. This can also occur if DTR is raised when a call comes in.

For incoming calls to work correctly, the modem must be told that DTR controls everything as described in number 3, and DTR must be low. To successfully dialout through the same modem requires that DTR must be raised. This means that to use the same modem to dialout, you *must* be able to RAISE DTR so that the modem will receive and respond to your configuration and/or dialout commands.

The RTE-A Driver Reference Manual describes the CN/Exec command sequences to control DTR in terms of connection and disconnection states and the resulting status of the line down bit in word six of the DVT. After a disconnection sequence that leaves DTR low, a successful write request requires the use of the special 37B function code, which raises DTR so that the modem set to pay attention to DTR will accept commands and respond. To activate connection with your modem, you either set the port timeout to 0, turn off modem control, and then turn it on again using the CN 30B and CN 31B commands, or you write a program to issue the commands with exec calls so you can implement the special 37B function code I just mentioned. Either way, this is a painful way to "talk" to your modem when its port is considered "disconnected."

An easier way to control DTR and get the status of one or all the ports is to issue commands to the controller port. This is documented in Chapter 3 of the *HP37213A/4A/4A/6A Systems Modem Installation and Reference Manual* and the Installation Section of the DAA 12854A manual. The DAA MUX panel control commands are identical to those for the HP Modem Card Cage, which may be why, except for the C and D (Connect and Disconnect) commands, they are not remotely intuitive.

The control commands supported by the 12854A panel are:

E, C, or V—raise (turn on) DTR (Pin 20) and RTS (Pin4)

Y, D, or W—lower (turn off) DTR (Pin 20) and RTS (Pin4)

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FIGURE 6 *Controller Port Initialization Commands*

```
* File: /CMDFILES/LU88DAA.CFG:::4:1:34
* DAA 12854A link with mux operates via channel 7 at 1200 bps
* using 8-bit framing, no parity, and one stop bit.
* Channel 7 is lu 88.  These commands set channel 7, lu 88 to
* 1200/8/1/NoPar;fifo enabled;cpu protocol;promt disabled;TO 5 mins
* The Gen Record for default driver parameters is:
*      dvt,/rte_a/ddc01.rel,MQTD_PORT7,lu:88
* If this entry is in the gen, this configuration file does not
* need to be executed at boot-up, but can be used to reset the
* port if needed. Channel 7, lu 88, is on BRG 0, by itself.
* All other channels are on BRG 1.
*---------------------------------------------------------------------
cn 88 35b 0
cn 88 16b 10b
cn 88 30b 77b
cn 88 21b
cn 88 41b
cn 88 33b 100000b
cn 88 34b 4
cn 88 22b 30000
```

HP37215A External Modem cards, and terminal cards. When used with the HP Modem card:

E—Configures the modem to auto answer
C—Connects the modem to line except when configured for local analog loop
V—Initiates a remote digital loop configuration
Y—Disables the modem from auto answer
D—Disconnects the modem from the line
W—Disables either a local analog loop or a remote digital loop

The DAA panel documentation does not indicate that any control other than the specified DTR and RTS toggles are supported.

If you haven't written or acquired a program to do it, you can control DTR interactively using the CO command to send the commands to the controller port 7. For example, to raise DTR on port 5, whose controller port lu is 87:

```
A1> co 1 87
Copying 1 to 87
5C
[ok]   (input terminated with cntl D)
A1>
```

You can also put the command(s) in a file and simply copy the file to the controller port.

While testing the controller port commands with my HP Modem Card Cage and the DAA MUX panel, I discovered that the "line down bit" set on completion of a disconnection sequence actually has nothing to do with the driver's refusal to accept I/O requests to a "disconnected" port. If I raise DTR on a "disconnected" port by sending a command to the HP Modem Card Cage or the DAA MUX controller port, the "line down bit" is unaffected. If it was set to begin with, it remains set, but once DTR has been raised, read and write requests finish normally without the special 37B function code. So it seems to be the state of DTR that determines acceptance and completion of I/O requests, not the DVT6 line down bit.

Controlling Other Serial Devices

HPMDM takes good care of incoming calls. However, several other common serial connections are not served by the HPMDM program but do require host/user control of DTR. For example:

- a modem that requires an active DTR to respond to host commands
- a serial link with a line driver that derives its power from pin 20
- any serial device that will not "talk" unless DTR is present
- a serial or DTC connection that will not disconnect unless a raised DTR is lowered

Each of these requirements exists on my RTE-A systems, and I have now moved each one to the DAA panel with no trouble. In each case, the existing applications continued to run without error. As with the dialout calls, it was a seamless, transparent hardware change.

RTE-A Installation

For full modem control support, use the "01" versions of the interface and the device drivers ID801.REL and

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CIRCLE 146 ON READER SERVICE CARD

Topics Coming in the July/August Issue of

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DDC01.REL. I have tried using HPMDM on a port that was genned with ID800 and/or DDC00, and it did not work. For the A-Series, the commands required to install and initialize this device are relatively simple.

Controller Port

There is a Gen Record, documented in the *Generation and Installation Manual* in the "Default DVT Entries By Driver Name," Appendix F, under the DDC00 driver, which can be used to give you the correct configuration for the controller port 7 at bootup. The Gen Record is:

```
dvt,/rte_a/ddc01.rel,MQTD_PORT7,LU:<your controller lu #>
```

If this is included in your answer file, no other boot-up initialization commands are required in your welcome file for the controller port 7. If you run SPORT on the controller lu after boot-up and before any commands have been sent to the port, it will say that the port does not respond to a dynamic status request and may not be initialized. However, after the first command has been completed, a subsequent SPORT will produce the usual port configuration display. For example:

```
A1> sport 87
Status for LU 87:                              950105.170339
Device Driver:          DDC01 Rev. 6100        Driver type = 00
Interface Driver:       ID801 Rev. 6000
      Firmware:                                Rev. 5.22
          CN20: Primary Program:               HPMDM (Disabled)
          CN40: Secondary Program:    HPMDM (Disabled)
          CN17: 000000B No user defined terminators
          CN22: 30000 Timeout = 300.00 seconds
          CN16: 000010B BRG0 range 8 (300 600 1200)
          CN30: 000077B Frame=8/1 None BRG0 1200 baud Port 7
          CN31: 000000B
          CN33: 100000B FIFO buffering 0 chars in fifo
          CN34: 000004B CPU Protocol
          DV20: 000077B Character mode
          DVT Address: 56635B; IFT Address: 62042B
A1>
```

If you want to replace your existing MUX panel with the full modem control panel without re-genning your system, you can initialize the controller port online. The commands to duplicate the required initialization can be put in a command (script) file, which can be used at boot-up or to reset the port "on-the-fly" if necessary. *Figure 6* contains a listing of these commands.

Modem Ports

Modem LUs should be configured as non-HP terminals. The following gen answer file entry will default the modem lu to tty protocol:

```
dvt,/rte_a/ddc01.rel,MTERM:5,LU:85
```

This entry will also default the time out to five minutes, enable PROMT as the primary scheduled program, and HPMDM as the secondary scheduled program. FIFO buffering, modem control, and a user-defined terminating character will not be set. The default data framing is 8 bits, with no parity and one stop bit. Unless initialized to a specific baud rate, the port will speed sense.

For insurance, and to have a currently accurate port configuration file available for emergency resets, the ports can also be initialized from the welcome file at boot-up. The following example sets up my dialin modem port.

```
*_____________________________________
* lu 86 - 8/1/none/9600,xon/xoff,fifo,
  disable promt
* lu 86 is on the D-MUX DAA modem
  control MUX panel
* lu 86 is on BRG 1; this config if for
  the dialin modem
*_____________________________________
cn 86 30b 136B
cn 86 21b
cn 86 22b 30000
cn 86 33b 0
cn 86 34b 1
```

Note that the modem control command is not included at this point, because HPMDM does that automatically for any port put under its control. If the port will be used only for dialing out, the modem control command is not required, since it will not be answering calls.

Dialin ports also must be put under HPMDM control so that PROMT will be scheduled. In the following commands, the first one adds the lu to HPMDM control, and the second tells HPMDM how to configure the port when an incoming call is connected. Since I do not want to risk the HPMDM default configuration being applied to my ports, I specify what I want for each one. In this case, the command specifies a speed of 9600, Xon/Xoff handshake protocol, and a 300-second timeout:

```
ru hpmdm 86 ad
ru hpmdm 86 BA=9600 HA=XO
TI=300
```

Using a port controlled by HPMDM to originate outgoing calls works fine, as long as you raise DTR before sending your commands. HPMDM does not interfere with this use of the port, so it is not necessary first to remove it from that control.

CIRCLE 31 ON READER SERVICE CARD

Documentation and Price

The biggest problem with modem setup and usage on the HP 1000 A-Series has been inadequate documentation. The simple manual that comes with the DAA Model 12854A Modem Control Multiplexer Panel makes it very easy to install and to configure the ports. I found the instructions for using the control commands to be simple, direct, and easy to follow. Although some of the wording comes directly from the *HP Modem Card Cage Manual*, it has been extracted carefully, appropriately, and effectively. I found the DAA MUX Panel to be an excellent product.

The DAA Series 12854A Modem Control Multiplexer Panel lists for $2,950.50. DAA also sells Cable Kits, Rack Mount Brackets, RS-232 6-50 ft Modem Cables, RS-232 25-75 ft Extension Cables, 10 ft Interface Cables, and Custom Length Computer-to-MUX Panel cables up to 50 ft with no external power supply.

The RS-232 Modem Control Multiplexer Panel, Model 12854A, is available from Digital Automation Associates, Inc., 310 W. Gypsy Lane Road, Bowling Green, OH 43402. Telephone: (419) 352-6977. ◧

Wendy King, a computer specialist at the U.S. Naval Observatory, has been managing HP 1000 systems and applications for 11 years. She can be reached at wendy@newton.usno.navy.mil.

by Chris Curtin

Why I Hate PCs

...OR THE TRIALS AND TRIBULATIONS of installing a PC network. Last Christmas I undertook what I thought would be a simple task: network two 486 PCs running Windows For Workgroups 3.11 to my HP 900/E55 server running HP-UX 9.04.

My first step was to define my requirements: I needed to share the network printers from my E55, I needed to transfer files between the PCs and the E55, and I needed to be able to back up the PCs from the E55.

The backup scheme I use is to mount all the disk drives available on the network to the E55, then use *find* and *cpio* to back up any files that have changed since the last full backup. Not the most elegant system, but it works.

The first approach I took in installing was to use the network drivers that came with my laser printers. I have a LaserJet 4si and a LaserJet 4, each with a JetDirect card and drivers for MS Windows. When I download the updated drivers from the HP BBS and install them, I immediately crash Windows. OK, I call HP support. HP support informs me that I cannot load the JetDirect drivers into upper memory because of the way they wrote the drivers. I toss the drivers.

Next I install Lan Manager from HP. The literature from my sales representative looks like it will do what I want, so I start to install it. First problem. Lan Manager requires a newer version of the STREAMS fileset than what I have. I get the newer version from HP and continue the install.

Now that the filesets are loaded, I start to follow the installation steps in the manuals. Guess what? The manuals are for either a Windows server or an OS/2 server. To install an HP server, you must use the command line versions. Of course, nothing in the documentation says this.

So I follow the steps in the manual, looking up each function in the command line reference manual and typing it by hand. In several places I cannot find command line equivalents of the install commands! Calls to the Response Center are answered quickly and correctly, but this does not make up for the poor documentation!

I finally get the server side of Lan Manager installed and install the client side on one of the PCs. Installation is smooth, but when I try to log in to the server, I always get an authentication failure. Again the Response Center helps, but we never do get the problem figured out.

Even without the authentication I can mount the server's disks on the PC and use its printers. Next step: Mount the PC's disk to the server. No way, says the Response Center. The only way to back up the PC's disks to the server is to use the DOS backup command to copy the PC's disk to a server disk mounted to the PC. This is how we used to do it using HP's ARPA Services on our 286 PCs. We bought new hardware so we would not have to do this anymore. This requires an explicit operation on the PC and wastes disk space on the server. So I give up on Lan Manager.

Next phase of the journey involves using SunSoft's PC-NFS product. I call the SunSoft 800 number, describe exactly what I need, with emphasis on mounting the PC's disk to the E55, and am told that PC-NFS is what I need.

So FedEx arrives the next morning and I install PC-NFS. Right off the bat, I have to hand edit my *config.sys* and *autoexec.bat* files because the install script does not correctly install my LAN card. With this done I fire up Windows. On my first try I cannot see the printers on

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the E55. PC-NFS does not include any documentation on the server side of the connection, so I look through my HP manuals. I find the *pcnfsd(1M)* man page and perform the configuration as required.

pcnfsd accepts requests from PCs that use the NFS protocol for printing and mounting remote disks. In this file you define the printers available to the clients (PCs) and a list of user IDs that can use these printers and mount the server's exported disks. Its configuration file is in */etc/pcnfsd.conf*.

The first entry I place in the configuration file is 'wtmp off'. This indicates that I do not want records of the PC logins. The second entry defines the user IDs that can log in to the server. According to the man page, *pcnfsd* will accept requests for any non-system account. However, this proves not to be the case, and the Response Center suggests that I define all the valid user IDs. I add the following to my configuration file:

```
uidrange 0-655376
```

The last item to configure for *pcnfsd* is the name of the printers accessible from the PC and the HP-UX command line to access the printer. Since the format of data sent by the PC does not match what the HP-UX *lp* spooler is expecting, you must tell the spooler not to try to interpret the data being printed. This is done with the *-oraw* option to *lp*. For example, the following line added to my *pcnfsd.conf* file allows the PCs to use the LaserJet 4si:

```
printer hp4si hplaser4si lp -oraw -dhplaser4si -onb
```

The 'printer' keyword defines the entry as a remote printer. The 'hp4si' field is the name of the printer from the PC's point of view. The 'hplaser4si' is the name of the printer as configured in the HP *lp* spooler and the rest of the line is the command called when the PC sends a print request.

With the configuration file changed, I kill *pcnfsd* and restart it. On the PC I immediately see the remote printers. So far, so good. I send a print request from the PC to the E55 and everything works great.

Next I start working on mounting the disks. Every time I try to mount a disk from the server, Windows locks up. After four days of working with SunSoft support, the people there determine that I cannot free enough memory in the 640K DOS area for Windows to work correctly. So I send it back. At least I know that the *pcnfsd* side worked.

It is now mid-January. So much for my Christmas project.... I still have to get the PCs on the network so my users can use them. I'm two weeks late in getting them online and people are getting annoyed. Next step, start calling everyone in the trade magazines who advertises a TCP/IP or NFS stack. In every case the vendors insist they can solve my problems, except for mounting the PCs to the E55. All of their solutions involve either copying the PC disks to a second disk, or not using the PC disk and installing all the PC applications on the E55's disk and mounting it at each PC.

Finally, I call NetManage and ask about their ChameleonNFS product. Their literature says they have both client and server NFS daemons in their product. Also that their product is a 100 percent Windows DLL and uses the *pcnfsd* configuration I have already completed.

The next morning the FedEx guy drops off two copies of ChameleonNFS and I prepare to install them. Installing the Lan Manager and PC-NFS packages has trashed my Windows *.INI* files and *my autoexec.bat* and *config.sys* files. I build each one by hand, using the Microsoft documentation to make sure I include everything.

Next I install the first ChameleonNFS system. After everything installs and I answer a couple of questions from their configuration programs, I can see my *pcnfsd* printers and my E-55 disks. Next I telnet to the E55 and can mount the PC's disk! I fool around with the ChameleonNFS side for another hour or so getting everything installed correctly, then install the second copy.

Problem solved, right? Not quite. Since the TCP/IP stack is a Windows DLL, if my users switch to DOS or start a DOS window, I lose my communications. There is no network printing from DOS or disk mounting. Also most of the time when my users enter DOS, they must reboot to get the NFS server to start correctly. Since my users spend most of their time in Windows, this is not an issue now and NetManage says they are working on it.

Also ChameleonNFS does not work nicely with Windows For Workgroups. To get both to work requires reconfiguring some of the networking setup in Windows and I am not comfortable with my users doing that. Thus I cannot run Windows For Workgroups networking. I still use the other features, though.

In conclusion I spent a lot of time on what should have been a simple and straightforward task. The frustrating thing was that the vendors of the PC networking software have not caught on to the type of installation I wanted to perform.

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CIRCLE 55 ON READER SERVICE CARD

What I really want to see is an NFS to Windows For Workgroups bridge that is seamless from the user's and administrator's point of view. Not *either* NFS *or* Windows For Workgroups networking. I want both.

Sorry that most of this column had to do with PC problems. As client-server computing becomes more mainstream, you may find yourself in the same situation. I hope by then your choices will be better.

Support and Recovery Tapes (Part II)

After my November 1994 and January 1995 columns, I received a lot of e-mail from users and HP about using the Support and Recovery tapes. Several readers pointed out that relying on these tapes as an absolute recovery mechanism is dangerous. I agree. These utilities should be part of your recovery scheme, not the whole thing!

I have a challenge for other administrators: If you are in the pharmaceutical, telecommunications, or another industry where absolute recovery is necessary (i.e., you must be able to restore an exact copy of the system before the crash, not upgrade or just reinstall HP-UX), I would like to work with you to write an article or series of articles about how you go about doing this. Drop me an e-mail and I'll put you in touch with the right people at Interex.

I also received some e-mail from HP training people about a class HP offers—PN: H5368S: HP-UX Troubleshooting. It covers the support tape, the recovery tape, and other advanced administration topics. I have not taken the class, so I cannot comment on its contents.

Challenge number 2: Since I was unable to completely cover the Support tape/CD-ROM functionality in an earlier column, I would like to have someone at HP describe the functions available and how to use them. Again, drop me an e-mail and I'll either work with you on the article or put you in touch with the right people at Interex.

Please keep the e-mail comments and column suggestions coming. ◧

Chris Curtin, a software developer for Bradley Ward Systems, Inc. in Atlanta, Georgia, specializes in device driver development for factory automation on the HP 9000. He can be reached via e-mail at: chris@bwilab3.atl.ga.us.

by David L. Totsch

Interesting Shell Question

WHILE ATTENDING THE JANUARY MARUG meeting in Charlotte, North Carolina, I was asked a question about the shell. The person wanted to write a shell that was serially reading a file with a 'while' loop. While reading that file, he wanted to prompt the user for additional information and instructions. This poses a problem. The standard input for statements within the 'while' loop will default to the standard input the 'while' statement itself is using. Therefore, the read associated with any prompt will read an additional line from the file and not the keyboard (as desired). To clarify the description, let's create an example.

For our example, let's say we are expecting strings of data to work on, but we want to give the user the chance to discard records that are exclusively numeric. Here is the contents of our data file, ostensibly named *input_file*:

```
this is a test
of the emergency
1234567890
broadcast
system
```

We want our shell to read the first line and process it, then progress to the second line. The third line is numeric, so we will ask the user if it is appropriate to process the line. Then the fourth line should be processed and then the fifth and last line.

Here is the shell script:

```
while FILE_INPUT=`line`
do
     echo "FILE INPUT WAS: ${FILE_INPUT}"
     if expr "${FILE_INPUT}" : "[0-9]" > /dev/null
     then
          echo "Encountered the following numeric input"
          echo "[${FILE_INPUT} ]"
          echo "Continue processing? (Y/N) \c"
          KEYBOARD_INPUT=`line`
          case "${KEYBOARD_INPUT}" in
               [Yy]|[Yy][Ee][Ss] )
                    echo "OK, the record will be processed."
                    ;;
               [Nn]|[Nn][Oo] )
                    echo "The record will NOT be processed."
                    ;;
               * )
                    echo "Your input [${KEYBOARD_INPUT}] \c"
                    echo "was not understood."
                    echo "The record will NOT be processed."
                    ;;
```

```
            esac
        fi
    done < input_file
```

Note that the 'while' loop takes standard input from our data file (*input_file*). This is what we see when we run the script:

```
FILE INPUT WAS: this is a test
FILE INPUT WAS: of the emergency
FILE INPUT WAS: 1234567890
Encountered the following numeric input
[1234567890 ]
Continue processing? (Y/N) Your input [broadcast] was not understood.
The record will NOT be processed.
FILE INPUT WAS: system
```

This is not exactly what we wanted to see occur. When the script prompted the user to decide if the numeric input should be processed, the script read from the input file and not the keyboard.

The solution is to map the input from the read inside the 'while' loop to the keyboard while not interrupting the 'while' loop reading its input from the file.

One way to accomplish this is to read from standard error. Remember that standard out and standard error are both references to the terminal screen (until you change them). Standard output is file descriptor 1. Standard error is file descriptor 2. Standard input is the keyboard and is mapped to file descriptor 1. Guess what, you can also read from file descriptor 2, which is also mapped to the keyboard. Therefore, we can tell the read inside the 'while' loop to read specifically from standard error input like this:

```
KEYBOARD_INPUT=`line <&2`
```

Now the shell run looks like we would expect:

```
FILE INPUT WAS: this is a test
FILE INPUT WAS: of the emergency
FILE INPUT WAS: 1234567890
Encountered the following numeric input
[1234567890 ]
Continue processing? (Y/N) n
The record will NOT be processed.
FILE INPUT WAS: broadcast
FILE INPUT WAS: system
```

In the spirit of UNIX (if you think about a task long enough, you should be able to come up with at least three ways of accomplishing it), here is a second method:

You can use the *exec* call to duplicate file descriptors. These file descriptors can be integers up to nine. I usually start at nine and go down. What I did was add the following line to the top of the script:

```
exec 9<&1
```

This creates a new file descriptor 9, which is a duplicate of file descriptor 1. File descriptor 1 is our keyboard input, which is what we want. The read within the 'while' loop then becomes:

```
KEYBOARD_INPUT=`line <&9`
```

The resulting run of the shell script properly prompts the user when the numeric data is encountered.

Both methods are equally valid. I would not say that it is convention to read from standard error, though. I would also have to say that I do not frequently encounter shell scripts that use *exec* to remap file descriptors. Also, the ability to use *exec* to manipulate file descriptors is not generally taught in shell scripting classes and is not widely known (until now?). Use whichever convention you like. Or, you can work on that third method out there somewhere. ◧

David L. Totsch has worked in several different organizations over the past seven years as a system administrator with various flavors of UNIX. At present he is working with HP-UX systems and wide area networks for a Fortune 100 company in the Piedmont area of North Carolina. He can be reached by e-mail at dtotsch@wfu.edu.

Internet Goodies

by Joe Berry

A Few Winners

MISC

Autoconf

Those of you who have compiled and built various GNU software products such as *gcc* and *emacs* will undoubtedly remember that you had only to run *configure* in order for the software to automatically determine your hardware and software environment so that the build would succeed. The Free Software Foundation has announced the new release of its *Autoconf* program that produces shell scripts for configuring software packages for various systems. Autoconf Version 2.1 is now available by anonymous ftp from *prep.ai.mit.edu* [18.71.0.38] in the file *pub/gnu/autoconf-2.0.tar.gz* (352k). Diffs from previous versions are not available, as they would be larger than the distribution.

The contributor of the software writes, "Autoconf is an extensible package of m4 macros and shell scripts that creates a non-interactive configuration script for a package from a template file. The template file lists the operating system features that the package can use, in the form of m4 macro calls, and can also contain arbitrary shell commands. Autoconf requires GNU m4. The configuration scripts produced by Autoconf are independent of Autoconf when they are run, so their users do not need to have Autoconf (or GNU m4)."

trace

And now for one of the neater pieces of software that I have seen in a while. A *trace* program for HP-UX 700 series systems! For those of you familiar with the SunOS *trace* program or the Solaris *truss* program, this is a great "it's about time HP had this" utility.

With *trace*, it is now possible to trace system calls and print them symbolically. The program is great for reverse engineering applications. You can use it for figuring out why an application keeps bombing out. I have already used this trace program to find out what file a program was trying to reference when the program bombed out.

This trace program prints out both system calls and optionally kernel traces of programs. It compiled with almost no problems on an HP-UX 9.05 system (it should do so on any HP-UX 9.x system). To build the program you also need Perl Version 4.036 or better.

I did have to uncomment out one line in the *Makefile* but this had been documented in the *README* file.

I tried porting the program to a Series 800 machine. After about one hour of work, the program did compile and execute. Unfortunately, that was when I realized that most of the instrumentation needed for the system trace was missing from the operating system. In other words, under HP-UX 9.00 or 9.04, *trace* is worthless. *trace* is only for Series 700 computers.

This great program was written by Kartik Subbarao of the HP Workstation Systems Division (subbarao@fc.hp.com). Thank you Kartik! The latest version (the author went through three versions very quickly) of *trace* is 1.3. It is accessible via ftp from *iworks.ecn.uiowa.edu in pub/comp.hp.*

COMP.SOURCES.MISC

rushcount

Most of the program submissions are considered serious submissions. Even the games distributed are serious in that they are the results of many, many hours of effort on the part of the developers of

that software. On occasion, however, a humorous submission can be found. Whether you like or do not like Rush Limbaugh, you are probably aware of his "America Held Hostage" counter: how many days are left in the current administration. For those of you who are into such trivia, Robert Perlberg of Dean Witter Reynolds, Inc., has submitted his *rushcount* program that generates the various counts that Limbaugh references at the beginning of each of his shows.

As Perlberg writes, "The spirit of this program does not necessarily reflect the political opinions of the author. I just thought it would be a nice programming problem and some people would get a kick out of it."

Perlberg can be reached at *dwrsun4!perl@murphy.com* or *perl%dwrsun4@philabs.com*. The program was posted as volume 45, issue 62.

Perl

Larry Wall of Netlabs (*lwall@netlabs.com*) has finally released Version 5 of his Perl language. Perl ("Practical Extraction and Report Language") is meant to be a replacement for shell scripts, *awk*, and *sed* all in one package. I have been using Perl Version 4 for a few months now and must say that indeed once you learn Perl, you will not want to do your pattern matching and report extracting in any other language. The difficulty with Perl, however, is that the syntax is not particularly easier than *sed* or *awk*—it's just different. This unfortunately translates into a sizable learning curve if you are to become fluent in Perl.

On the plus side, however, you don't need to know much about Perl to make it work for you. O'Reilley and Associates publishes two books on Perl that take you through the learning experience with real programs and examples. The books are indispensable for learning this language. Perl is really worth looking at. Personally, I am going to continue using Perl Version 4 for a few months longer only because of the wide availability of this version (it even runs on PCs with DOS). Perl Version 5 for DOS and Macintosh computers will be available soon. Perl was submitted on volume 45, issue 64 (in 64 parts).

dtree

dtree is a cute and useful utility that presents a quick and dirty character-based graphical view of the directories on your system. Its output looks something like this:

```
        |-df————
        |-ftw————
        |
        |              |-bin-src-
        |              |-date——
        |-gnu————|-install-
        |              |-lib——
|-src-|              |-libc——
        |              |-tput——
        |-misc———
        |-patches——
        |-printf——
        |-qterm———
```

The program was written by Dave Borman and submitted as volume 47, issue 85. It's a small program that you should be able to compile and use very quickly. I've added it to my collection of utilities.

COMP.SOURCES.X

xsokoban

xsokoban is a tricky puzzle game with 90 levels of complexity to solve. The object of the game is to push all the balls into the score area. You must always be behind the ball when you push it (therefore, if the ball ends up in a corner, you're stuck). It's a neat game; once I had gotten the hang of it, I wanted to continue playing. I hadn't heard of the game before this posting, but since then I have found a copy that runs under MS-DOS with Windows 3.1 (my oldest daughter has become addicted to the game—it was either get a copy of this game that runs under DOS or give her access to my UNIX workstation).

One of the really interesting things about the game is the way you keep the score information. In one mode, the information is maintained on a local file. In the WWW mode, the score information is actually kept on a public *xsokoban* server maintained by Andrew Myers. You are essentially competing in this game against people from all over the world! The one drawback to running the program with a distributed scorekeeper is that it is quite slow starting up. I believe the delay is the download of all the previous scores.

The documentation references a site where you can get more information about *xsokoban* via a WWW client (such as Mosaic). I went to that site, *http://clef.lcs.mit.edu/~andru/xsokoban.html*, and found that there was an even newer version (I had just gotten Version 3.2e) called 3.2f of the software available. I downloaded it and rebuilt my game.

Building this software on an HP system is quite easy. The author suggests that you build the software by including another package called *xpm* (I'm not really sure what it does). The installation notes tell you from where you can download this software. Building both packages posed no problems other than the following two gotchas. First, do a

`mkdir X11` in the *xpm-3.4c* directory. Second, modify the file *config_local.h* by adding the following statement:

```
#define NEED_NETINET_IN 1
```

If you don't do this, you'll get unresolved references to variables *htons* and *ntohs*.

ALT.SOURCES

chtim

From Kevin Ruddy of Powerdog Industries comes a really nifty little utility called *chtim*. This program is similar in concept to programs such as *chown* and *chmod*. *chtim* changes the various file times associated with a file. It has lots of options including such things as changing file times recursively down a directory. It has a *Makefile* option ready to go for HP-UX systems. Unfortunately, there appears to be a minor error in it. The author of the software is under the impression that HP systems do not include the system procedure *strftime()*. My HP 9000/735 (running HP-UX 9.05) does have it. So just comment out the line that says "FUNCTIONS = strptime.o" (that should be line 19).

I also submitted a couple of small changes to Kevin that made the program work on my RS/6000; he will be including the changes in a future version. This program is available from *ftp.powerdog.com* in *pub/chtim*.

pdksh

Just about every major UNIX computer manufacturer, including HP, includes the three "major" shells: the Bourne shell (*sh*), the C shell (*csh*), and the Korn shell (*ksh*). Of the various platforms I work on, only SunOS (not the new Solaris) does not include ksh. And now, Michael Rendell of Memorial University of Newfoundland (Canada) has submitted a public domain Korn shell that is a clone of the AT&T Korn shell. While I'm not sure who needs such a program (how about porting it to a PC?), it might be fun to see how a shell is written.

This program is available from site *ftp.cs.mun.ca* in directory */pub/pdksh* as file *pdksh-5.1.0.tar.gz*. It has been ported to Suns, HPs, DecStations, and PCs running Linux. While the program is rather complete, a few features are still missing—specifically, exported aliases and functions, set -t, ERRNO, LINEONO, and LINES parameters, extended file globbing/pattern matching and trap DEBUG.

However, for those multi-platform sites looking for a good (something better than Bourne shell) consistent shell to use with all their applications, this might meet the requirement.

xmcolor

I've needed this program for a long time. I frequently need to choose a color for an application when the default colors aren't to my taste (or rather, aren't to my sight). An example might be changing the background color of an xterm window. There are two ways to define a color using x. The first way defines the color as three 4-character hex codes (the color 'coral' for example is #FFFF7F7F5050). The second way requires looking at the color names as defined in the file /usr/lib/X11/rgb.txt. What I have always done in the past is to pick one of the color names from this file and try it out. If it looked good, I would choose it; if not, I would pick another.

xmcolor is a simple Motif-based color mixer utility that displays the color represented by the hex code displayed. The hex code can be entered manually. In addition, there are red, green, and blue sliders that allow you to mix the three principal colors to make any color you want (the equivalent hex code is also displayed). But what I like the most about this program is that I can also choose from the complete list of colors defined in *rgb.txt* and view that color by simply clicking the mouse on the color name. The software is available from *ftp.x.org* as */contrib/applications/xmcolor/xmcolor1.0.tar.gz*. This program is simple but useful.

COMP.SYS.HP.HPUX

xmcd

An interesting contribution arrived in this newsgroup from Ti Kan. *xmcd* (Version 1.3) is a Motif CD player package. This package includes an X11/Motif-based CD player utility as well as a command line driven CD audio player. It is supported on many platforms including HP-UX 9.x systems. Source code is available via ftp from *ftp.x.org* in the */contrib/applications/xmcd* directory. In addition to the sources, this directory also includes an *xmcd* CD database. Unfortunately, I haven't tried this software so I cannot attest to its quality. But it sounded (get it?) interesting. ◧

Joe Berry is a senior software developer at Landmark Systems Corporation in Vienna, Virginia. He is one of the authors of Landmark's performance monitor, TMON for UNIX. A former HP 3000 systems specialist for Hewlett-Packard, he has been in the computer industry for more than 20 years. He can be reached at joe@landmark.com.

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X-Watch

by Larry Headlund

I18N

INTERNATIONALIZATION (THE ACRONYM I18N comes from the eighteen letters between I and N) is a goal, a set of tools, and a minefield of competing standards. X has an important role to play in internationalization.

The Why and What

Internationalization, which I define as programs coded and designed to work in different languages, exists because there are different languages. If we all used English or Latin or Esperanto or whatever, computer programs would be written to that single target and we would be done with it. Since we want our programs to be used by (and sold to) as wide a market as possible, we can't restrict ourselves to just speakers of our mother tongue. Those with time and money to waste could recode their applications for each language, but the rest of us need a better way.

For a brief instant at the birth of graphical user environments, it was thought that maybe we could finesse all this through icons. Icons would be language-independent and those cute little pictures would be universal. It didn't work out that way. It turned out that many icons were culturally dependent. A prime example was the mailbox with the flag up to let you know that some e-mail had arrived. Instantly understood by the country-bred American, comprehensible to other Americans, meaningless to the rest of the world. A more fundamental problem is that some things don't lend themselves to pictures. There is no universally graspable symbol found so far for *undo*, to choose one case. This should be clear if we contemplate Chinese. Written Chinese is an iconographic language and the thousands of years in its development should lead to the clearest expression possible. Try to make sense of a page of Chinese if you haven't memorized the characters. The pictorial significance, if any, of the characters is useful as an aid to memorization, not as a key to deciphering them.

Hows

A first step is to isolate the language-dependent parts of your code. Note how this parallels the GUI design principle of separating the presentation and the functionality. Start by getting any strings out of your code and into a separate file. The program *strings(1)* is a tool for getting a list of all the strings in a file, useful if you are internationalizing an existing program. In a non-X world, you would put all the strings in a named file and access them from there. You could idiosyncratically name the file and use your own custom functions for access, but there are standard utilities for this. Check out the *catopen(3C)* and *catgets(3C)* man pages for details. This family of functions uses the LANG environmental variable. Hence your different language files will have $LANG somewhere in their path name. Don't forget to make your single character responses, i.e., [YyNn], internationalized also. It is natural in X to do all this with the resource files.

The accepted way to organize your resource files for multiple languages is in subdirectories under the *app-defaults* directory. Each subdirectory has the name of a LANG value. This is the way HP itself handles its National Language Input/Output (NLIO) programs and I see no advantage in being inconsistent. So if you have a program *foo* with resource file *Foo*, you will have resource files *app-defaults/french/Foo, app-defaults/chinese-s/Foo*, etc. for each language supported as well as an *app-defaults/Foo*. This last is for when the LANG variable is not set.

These arrangements do cause me a

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problem with my favored GUI programming tool. As readers of this column know, I am partial to David Smyth's Widget Control Language (WCL). With this tool much of the functionality and all the appearance of an application are defined within the resource files for that application. I say files, plural, because WCL provides a way for an application to be broken up into multiple files loaded from the master resource file. Now good design principles, and particularly object-oriented design, keep the specifications for each module together and local to that module. I even label with comment header *!Public* those parts of the resource file such as text strings, label strings, and fonts, that a user can modify, and use *!Private* for the more fundamental properties. You see the problem? If I follow all these rules, I am forced to have the structure of the program duplicated in multiple resource files for each language. This means that modifications (enhancements and defect fixes) to the programs must update multiple files. The only way around this I can see is to relax the locality restriction and have the master resource file set, and therefore have the master resource file aware of the components of modules.

Okay, we have all the language-dependent parts isolated. Are we done? No, because there are different alphabets as well as different languages. Even restricting ourselves to Western European languages, French has acute and grave accents, German and Scandinavian languages have umlauts and less pronounceable additions, Spanish has *ll* as a distinct character (you didn't forget to make your alphabetic sorting language-dependent, did you?), and so on. You won't see any of these characters on keys of the standard keyboard.

In the old days, some countries adapted by accepting mappings, usually of characters such as [or }, to characters of their national alphabets. This had some interesting side effects. Some printers would print out the standard ASCII character, some would print out the mapped character. This made for interesting reading when you sent, say, a C program by Telex. (For the youths in the audience, Telex is sort of a cross between fax and e-mail. You typed your message into a special Telex machine and the message was transferred to a similar machine on the other end of a telephone connection. Telex is far more efficient for transferring text than fax, but only text can be sent. The Telex address on your business card had some of the same cachet in those antediluvian days as an Internet address does now. For a while in the early 1980s Western Union offered dial-up computer accounts that allowed you to send and receive Telexes from your personal computer. You still see Telex machines, especially in Europe and Asia and in U. S. businesses that do a lot of overseas business.)

This ambiguity of display sometimes can be eliminated in an eight-bit or bigger world. If you look at an ASCII table for the full 255 characters, the inclusion of which is required by law for every computer book, you see that above the 127 characters that English fits into are some national characters, which is how English speakers refer to characters that are not in our national alphabet. Most dumb terminals will display them, given the correct 8-bit code. You may have been treated to a sampling of these characters while attempting to log in with your parity set incorrectly.

There is another approach to the display problem: multiple fonts. Most common with printers, but available on some dumb terminals, this replaces the standard mapping with a new character set. One very common example of this is mapping the ASCII octothorpe (#), what we call in the U. S. the pound sign, to the English currency symbol of the same name. The advantage of this is that you can get non-ASCII characters in a 7-bit world. Portability is a real problem, unless you know you have identical equipment at all sites.

Even with 8-bit characters, the alert reader will notice a problem. There are no keys for these characters. Mapping keys locks you out of the normal characters. Monster-sized keyboards have been tried, but not too successfully. The most popular solution (anyone suggesting *echo "\0nnn"* goes to the back of the class, except for printer programs) is to map two-key combinations to the new characters. This requires a special key, a compose key, to tell the terminal that what is coming is a multiple-character combination to be mapped to a single displayed character. Not the most convenient solution, but one that has proved acceptable.

So with input and output taken care of in a more or less standard keyboard and an 8-bit character, are we done? Not by a long shot. Note that above I said Western European alphabets. Without going too far east, we find the Greek alphabet, the Cyrillic (Russian) alphabet, Arabic, and more. Anyone can see that we are not going to shoehorn all these characters into 8 bits. Not to mention Chinese, Japanese, and Korean with their thousands of characters. We have to go to 2 bytes, 16 bits.

We will explore the world of 16 bits in the next column. ❑

Larry Headlund is president of Eikonal Systems and has been working with commercial UNIX since 1982 and with X since 1987. He can be reached at lmh@world.std.com or 617-482 3345.

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CIRCLE 24 ON READER SERVICE CARD

HP 1000 Guru

Q: I am using the following program to create a symbolic link for a file */DEV/TTY0* to point to the system console. When the program then opens and writes to the symbolic link, it does not send the output to LU 1, and it appears to corrupt the link file. What am I doing wrong?

Here's the program:

```
ftn7x,s
      program slink
      implicit none
      integer i,err
      integer dcbslink(16),dcb(144)
      integer FmpOpen,FmpClose,FmpWrite,FmpMakeSLink

      if (FmpMakeSLink(dcbslink,err,'1','/DEV/TTY0').lt.0) goto 76

      if (FmpOpen(dcb,err,'/DEV/TTY0','rwl',1).lt.0) goto 76

      write(1,*) err

      if (FmpWrite(dcb,err,16HHello, world... ,16).lt.0) goto 76

75    goto 77
76    call FmpReportError (err,'/dev/tty0')
77    err = FmpClose (dcb,err)
      end
```

A directory list of the link file shows the following:

```
lrw----r--  1 walt  nogroup  1 Feb 6 14:49 tty0 -> hello, world
```

A: The problem with this program is the *FmpOpen* call. Though you are passing *FmpOpen* the name of a symbolic link file, you *do not* want to use the 'l' option. The 'l' option is used only when you want to open the symbolic link file itself. In this case, since you want to open the destination, LU 1, do not use the 'l' option. The *FmpOpen* should look like this:

```
if (FmpOpen(dcb,err,'/DEV/TTY0','rw',1).lt.0) goto 76
```

This will "open" LU 1 and the *FmpWrite* will "do the right thing."

Q: For years, my system disk configuration has included a 400-track LU 16 and a 943-track LU 17. This is the way the original RTE-A Primary system was configured. I see now that the 6.1 Primary has changed the track map so that LU 16 is 4096 tracks. Since I boot from LU 16/17, is there any way to reconfigure these LUs without using

a second disk as a temporary boot LU? I have only the one disk on my system.

A: Yes this can be done. It will require planning and adequate free space on the disk in order to move */SYSTEM* and */PROGRAMS* to an LU that resides past LU 16/17. Perhaps a "picture" of the disk configuration would help:

Current configuration:

LU	#TRACKS	CONTENTS
16	400	BOOTEX
17	943	/SYSTEM & /PROGRAMS (Boot LU)
18	320	/USERS
19	266	/SCRATCH
20	352	misc
21	2229	misc
22	821	misc
23	5413	misc

For example, lets say we want to reconfigure LUs 16-17 as a single LU, using LU 23 as our temporary boot LU.

The steps are as follows:

1. Perform an *ASAVE* of LU 16 and 17
2. Create a */TARGETPROGRAMS* and */TARGETSYSTEM* on LU 23, making sure there is enough free space to hold the files from */PROGRAMS* and */SYSTEM. FOWN* can be used to determine how large these directories are.
3. Copy */PROGRAMS* and */SYSTEM* to */TARGETPROGRAMS* and */TARGET-SYSTEM*, respectively.
4. Regenerate your system to combine LU 16 and 17 into one 1343-track LU, eliminating LU 17. Do *not* change any parameters for any other disk LUs, especially LU 23 in this example. Place the new system and snap file in */TARGETSYSTEM.*
5. Create a boot command file that RPs programs from */TARGETPROGRAMS*, and references the new system and snap and swap file in */TARGETSYSTEM.* Place this boot command file in */TARGETSYSTEM.*
6. Reinstall BOOTEX (on LU 16) to mount LU 23: (Assumes FMGR LU 16)

```
INSTL

Enter snap file,system file,destination file,lu,source file

New_snap_file,New_system_file,BOOTEX:-32767:16,23,/RTE-A/bootex
```


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7. Boot the new system using the boot command file created in step 5.
8. Once the system is booted successfully, you must re-initialize the new LU 16 as either FMGR or CI, whichever you want.

   For a CI volume:

```
CI> IN,16,76 (768 to reserve room for BOOTEX)
```

   For a FMGR cartridge:

```
FMGR: MC,16
FMGR-103
FMGR: IN,,-16,16,LU16 (or whatever CRN you want)
FMGR:
```

   At this point, you should have a large empty LU 16 with BOOTEX still intact (the IN commands above *will not* destroy BOOTEX). If in doubt, simply run INSTL again to make sure. Now to make LU 16 the boot LU, perform the following steps (similar to above, only reversed):

1. Create a */PROGRAMS* and */SYSTEM* on LU 16.
2. Copy */TARGETPROGRAMS* and */TARGETSYSTEM* to */PROGRAMS* and */SYSTEM*, respectively.
3. Reinstall BOOTEX (on LU 16) to mount LU 23:

   For a CI LU 16:

```
INSTL,New_snap_file,New_system_file,0,16,/RTE-A/bootex
```

   For a FMGR LU 16:

```
INSTL
Enter snap file,system file,destination file,lu,source file
New_snap_file,New_system_file,BOOTEX:-32767:16,16,/RTE-A/bootex
```

4. Boot the new system using your original boot command file.

   Your system should now be as it was, but with LUs 16 and 17 combined.

   One word of caution: Once you start this procedure, carry it through to completion, since if the system is accidentally turned off or halted in the middle, it may not reboot. If this does happen, use your bootable ARSTR and restore the *ASAVE* made in step 1.

Q: How does the HP 1000 Guru manage his system backups?

A: This is a question that every system manager must ask himself. Bill Hassell once said, "There are two types of computer users: those who have lost data and those who are going to some day lose data." A clearly defined, consistent backup strategy will go a long way to making such loss relatively painless.

The HP 1000 family of systems has had a plethora of backup utilities available over the years. I won't delve into all of these; rather I will describe the method I use to make backing up an RTE-A system simple, effective, and best of all, automatic.

The two primary questions about backup strategy are *how* and *how often*. The first question will be the focus of this discussion; the second is generally answered by asking yourself how much data you can afford to lose. In my case, I don't want to lose any data so I back up every night.

First of all, the system I am using is an A990 running 6.1 RTE-A. I have several tape devices available, and currently I am using a 1.3-Gbyte DDS drive. The advantages to using the DDS should be obvious: speed, storage capacity of the media, and physical storage space the tapes require. I can carry my entire system backup in my shirt pocket. Not recommended while bicycling.

In order to recover from a catastrophic system disk failure, an *ASAVE* backup is the easiest and best way to recover. It is possible to reconstruct a system from a fully equipped memory-based system and a full *FST* backup. But it certainly requires more preparation and effort. (*Note:* The 6.1 Primary system is installed in this fashion, but it includes a custom program, *!RESTORE*, in the memory-based system which performs all the work).

Continued on Page 75

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CIRCLE 143 ON READER SERVICE CARD

LISTING 1

```
* FST backup command file
*
* This script performs an incremental backup of all
* files nightly to DDS tape on REMUS.
*
* Full ASAVE peformed when appropriate,
ll /walt/fst.log a
ti REMUS Incremental backup
mt 5
Quiet
Append
Clear
Keep
ba @.@.eb
Go
```

LISTING 2

```
FTN7X,l
   program nitly_fst
c
ccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c
c   NITLY is time scheduled nightly and performs an incremental
c   FST backup of all files that are new or have the backup bit set
c   A fresh FST is started AFTER a full system ASAVE is performed
c
c   See file fst_cmd.cmd::cmdfiles for set of files being
c   backed up.
c
ccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccccc
c
   implicit integer(a-z)
   integer param


c
c   Schedule FST with transfer file to perform backup
c
   call FmpRunProgram('fst,tr,fst_cmd.cmd::cmdfiles',param,back)
c
c   Schedule SENDMAIL to mail FST log file
c
   call FmpRunProgram('sendmail,-k,/temp/fst.log',param,sendmail)
c
c   Schedule EDIT to clean up the log file for next time
c
   call FmpRunProgram('edit,/temp/fst.log|4,$k/|er',param,edit)

   end
```

In my case, I simply perform an *ASAVE* of *all* disk LUs after any major system update/regen, or every 2 months. And of course, I have a WORKING memory-based system in order to recover in the event I lose my boot disk.

Second, I back up files nightly using *FST*. I initially create an *FST* backup tape, using a mask including the "B" qualifier, and the C option (see *Listing 1*). This performs an incremental backup using the backup bit, and then clears the backup bit. Subsequent backups are then appended to this tape nightly.

My nightly backup is time scheduled from the welcome file to run at 1 a.m., via a program. (see *Listing 2*). This program performs an *FST* backup using a command file (see *Listing 1*), logging the results to a file, and then using MAIL/1000, mails the *FST* logfile to me. This way, when I come in in the morning, I expect to have e-mail from my system with the result of the overnight backup. I do this on several systems, with the mail being sent to my central RTE-A system where I read all my e-mail. In this way, I never have to remember to check the logfile; it just appears in my e-mail. I can then review it for any problems, and delete the message.

The files that are being backed up, via */cmdfiles/fst_cmd.cmd*, can be easily modified. The example shows a simple *@.@.eb* which backs up all files, everywhere, checking for and clearing the backup bit. In actuality, on my systems, I back up selected directories.

A consistent backup procedure will go a long way towards minimizing any data loss when it occurs. ◧

Walt Boeninger is a support engineer at the HP Response Center in Mountain View, California. He has been supporting the HP 1000 for more than 15 years.

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CIRCLE 40 ON READER SERVICE CARD

CSL Perspective

IT'S THE DEAD OF WINTER in upstate New York and a lot has happened since I wrote last. Before I carry on with the discussion about the "how-to" of CSL program installation, let me get a few small items out of the way.

Many of you probably are aware that InterWorks (the HP Workstation Users Group) and Interex are working through a process leading to merger. As part of the InterWorks merger plan, Dave Shaw has joined the CSL committee. Dave has served as the InterWorks Librarian, providing leadership and organization to their large collection. Dave brings with him a lot of experience and energy and we are indeed fortunate to have him.

I would also like to announce that we're losing two members of the committee, Art Gentry and Craig Lalley. Art was the catalyst for starting the HP-UX CSL, beginning with the first Swap Tape at the Orlando Conference in 1988. Art has been a valuable resource to the organization for many years and we wish him well with his new businesses. Craig served for a year on the CSL-MPE committee and provided some much needed user experience. Craig is also an avid cyclist and will be spending much of this summer riding around the country.

With these departures and the evolution occurring within Interex, the CSL Coordinating Committee (CSLCC) has made a recommendation to the Board of Directors to abolish the existing CSL committee structure. That structure consisted of the three CSL operating committees and several members of the Interex staff. The chairman of each operating committee serves on the CSLCC along with a separate coordinating chairman. With the pending changes in committee makeup as well as our established operating procedure of holding joint meetings, we believe the time is right for establishing a single committee structure. This single structure will initially be made up of the existing members of the operating committees, who will continue to develop the vision and policy document. Later in 1995, after establishing a business plan, we will need to re-evaluate our operational needs for the long term. Any comments or suggestions you have as the year progresses are welcome.

Now resuming our regularly scheduled program already in progress....

In the January and March issues of *hp-ux/usr*, I gave a tutorial on how to install programs from the CSL. Armed with that knowledge, you should be able to use most of the contributions successfully. This month I'll tackle the unique installation steps for the X Window and Motif contributions. Those with workstations or X terminals will want to read on.

The X Window system was developed in the mid-1980s on the MIT campus as part of Project Athena and has quickly become the de facto windowing system for UNIX workstations. X11, the current version, has undergone six releases and vendors such as HP have incorporated the current version into their operating system software. In particular, HP has provided various pieces of X11R4 and X11R5 simultaneously on HP-UX 9.xx for several years. Motif, developed by the Open Software Foundation, is a toolkit and look-and-feel extension built on X11. It, too, has gone through a few release changes and currently HP has both Version 1.1 and 1.2 on HP-UX. Unfortunately, HP has slipped up in providing complete implementations of some X11 software.

X11 consists of four major pieces. First is the X-server, a stand-alone program that manages the graphics display. Second is a set of client programs that provide basic functionality. Third are collections of C header files, corresponding to the various function and toolkit libraries, and last are the libraries themselves. It is in these last two areas that the CSL runs into potential problems. Most of the X and Motif software on the CSL assumes that all the X11 pieces exist. The Developers Toolkit has most of the libraries and header files. The missing pieces include the X11R5 versions of *libXaw*, *libXmu*, *libXext*, and their corresponding C header files. These pieces were included on HP-UX 8.x, but for some reason HP neglected to include them in 9.x.

In order to work around these discrepancies, some enterprising users have provided these missing pieces as separate CSL contributions. On the 3419 release is contribution *Xaw-5.00* (f0002), which includes the missing header files as well as precompiled libraries for HP-UX systems. Once these are installed, you are halfway there. The other contribution to install is *imake-5.03* (f0001). In a nutshell, *imake* will take a collection of configuration data (Imakefile, templates, .defs) and create a Makefile for that program. This provides machine- and operating-system independence in building the software. If you wish to learn more about *imake*, see Larry Headlund's XWATCH column in the January and February 1993 issues of *Interact*.

Once *imake* and the library contributions are installed (there are explicit installation instructions for each), the process for compilation of an X11 or Motif application is straightforward. Also remember, you need a C compiler and the HP X Windows developers Toolkit as well.

TABLE 1
CONTENTS OF SUBDIRECTORY

```
$ ls
CHANGES       ad2c*          crolo.man      patchlevel.h   rolox.c
Imakefile     arrows.c       getopt.c       prolo.c        rolox.h
Imakefile.std arrows.h       mrolo.ad       prolo.man      sample
MANIFEST      callback.c     mrolo.ad.h     rolo.c         sample.Z.uu
MRolo.ad      compat.c       mrolo.bm       rolo.h         xr2mr*
Makefile      compat.h       mrolo.c        roloP.h        xr2mr.man
Makefile.std  creation.c     mrolo.man      roloc.c
README        crolo.c        myregexp.h     roloc.h
```

Let's build *mrolo* from the 3419 release as an exercise. After unbundling *mrolo* (following the instructions in my previous columns), you will have the files in a working directory, as shown in *Table 1*. According to the README file, to compile this program you enter 'xmkmf' and then 'make'. Xmkmf will run *imake* against *mrolo*'s Imakefile, producing a customized Makefile for this installation. Are you getting confused yet? Actually this whole process of customizing the installation to your site-specific needs is pretty slick. After 'make' is through, you will have the executable, ready to run. You can run it from this subdirectory as a test before installing it into system directories. You may also notice the file *MRolo.ad*, the "applications default" file for the application. These files usually live in */usr/lib/X11/* app-defaults or in a personal applications default directory. Some X applications won't run correctly unless their app-defaults file is put in the correct location. We're in luck with *mrolo*; it has a default behavior.

Once you are ready to install *mrolo* in its final location, 'su' to root and enter 'make install'. If you wish to install *mrolo* on other systems, just copy the relevant files (executable, man page, app-defaults file, etc.) to the destination system along with the relevant libraries (*libXaw.a, libXaw.sl, libXmu.sl libXmu.a, libXext.sl, libXext.a*). Most of the other X11 or Motif programs should be almost as straightforward. Some may require changes to directory paths or configuration data, but for the most part the stuff on the CSL will compile on HP-UX with little difficulty. ◧

Paul Gerwitz is chairman of the CSL/HP-UX committee and is a technology specialist at Eastman Kodak Company in Rochester NY. He can be reached at 716-477-3067 or e-mail at gerwitz@interex.org or gerwitz@kodak.com.

Industry Watch

I want my OPTV! Open TV, that is, unveiled in February by Thomson Consumer Electronics. Open TV is actually a software framework that resides on media servers at one end and set-top receivers at the other. Sun is providing the servers, workstations, and network for the system. Open TV promises a host of interactive services and entertainment such as ticket ordering, video-on-demand, and information requests. Of course, Open TV would be open to advertisements. The real entertainment will be watching the telecom, cable, satellite, and broadcast operators scrambling over one another for a position on the medium. Sun and TCE claim Open TV will work through existing broadcast networks or ATM switched networks, with point-to-point support on the way. Maybe I just want my old TV.

I won't likely get it, though. Interactive is coming at us from all directions. Digital also announced in February a new relationship with Advanced RISC Machines (ARM) and outlined plans for its piece of the interactive, multimedia game. The alliance is slated to produce low power dissipation 32-bit RISC products, dubbed StrongARM, for consumer and other interactive applications. The companies claim that StrongARM will be ideal for set-top interactive TV receivers, as well as next-generation Personal Digital Assistants, video games and multimedia "edutainment" systems, and digital imaging.

Meanwhile, IBM is looking for a place on the giving end, announcing that its System/390 and UNIX-based POWERparallel systems will support video-serving applications. IBM is positioning its big boxes as having the bandwidth necessary to support byte-intensive video and interactive applications for everything under the sun—from the manufacturing floor, to classrooms and living rooms, to research labs. Of course, when new data compression methods emerge, bigger may no longer be better. So I can only ponder, if you're going to go interactive, is it better to give or receive? ◧

Industry Watch is written by James H. Gamble.

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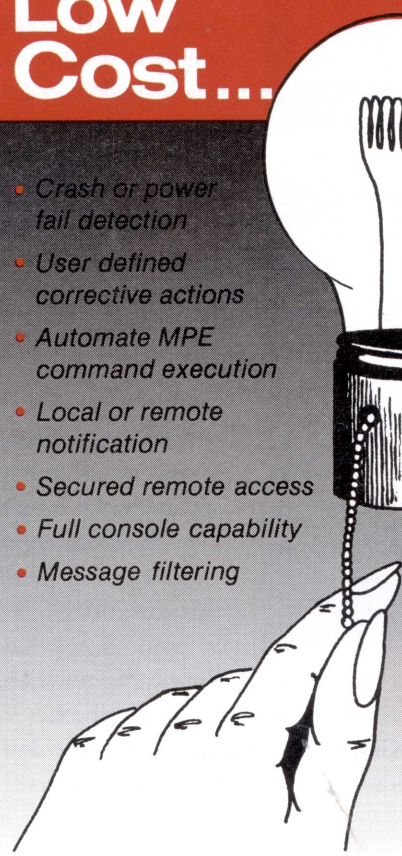

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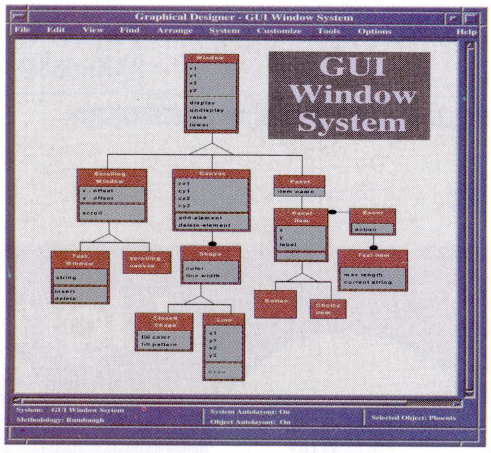
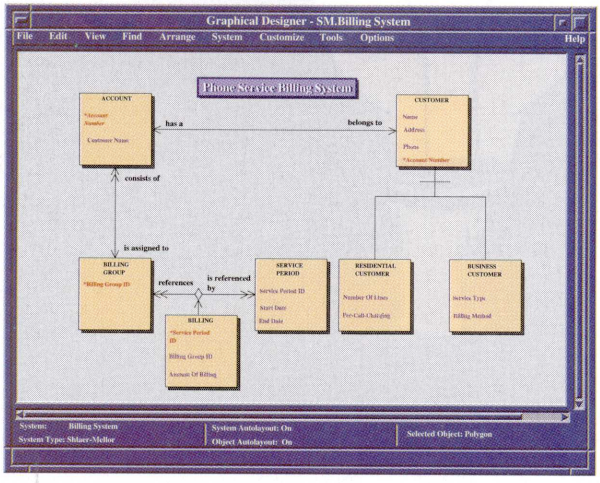
Product Focus

Graphical Designer

Greg Schottland, President of Advanced Software Technologies, Inc. (ASTI), believes that CASE tools have a bad reputation. Having been a customer of CASE tools for 10 years, he observed that such tools have "overpromised and underdelivered." Specifically, current products are not user-friendly, which is why "if you were to pick up a phone and call a developer, chances are he doesn't use a design tool."



GUI designed using the Rumbaugh OMT methodology



Billing system designed using the Shlaer-Mellor methodology

Schottland created Graphical Designer because software quality is an issue for developers. He drew an analogy between the bugs that plague software engineering and an equivalent (but hypothetical) epidemic in civil engineering, a situation in which "buildings are falling down after three years." He added, "I like to compare software development with other forms of engineering, because software developers thought they were different." While acknowledging that a few software bugs generally aren't life-threatening in the way that a collapsing high-rise might be, he pointed out that computing plays an increasingly critical role in business.

Graphical Designer's ease of use and extensibility (or meta-CASE features) have differentiated it from other CASE tools on the market, Schottland said, enabling users to develop applications much faster than traditionally possible. The product's inventor maintains that ASTI's biggest obstacle is public perception: "Our competition is not other products; our competition is that people are not using (CASE) products."

Schottland emphasized that users with no technical experience can be up and running on the tool in 15 minutes, because it is highly graphical. "Almost nothing happens in the tool without a point-and-click operation." Automation of drawing designs includes automatically centering contained objects, appropriately attaching and spacing the links between objects, and aligning object names. All the attachments and layout between objects is retained whenever objects are moved or resized.

The Graphical Designer supports all constructs used with the OMT Object Model and the three different models that comprise the Shlaer-Mellor methodology. The tool generates detailed C++ code from OMT Object Model or Shlaer-Mellor Information Model diagrams. When generated, this code contains all the necessary information for implementing the structural aspects of classes, as well as the details of their inheritance and associations. Full support for other object-oriented methods, as well as traditional structured methods, is also provided.

By combining ease of use with "forward-engineering" or "meta-CASE" features, Graphical Designer can adapt to support other methods quickly. Schottland recalled that one company used a beta version of the tool to build a CASE method from scratch within a week. On another occasion, one of

ASTI's engineers took a faxed diagram of designs, generated a method in Graphical Designer, and had it ready for the client in four hours. Schottland boasted, "That's something other (tools) can't do."

The tool provides a GUI to all the components of a design methodology, so users can define new objects, relationships, and the manner in which code is output. Users can also modify how design objects should be rendered on the drawing area and as icons. Entirely new objects, relationships, and code generation specifics can also be created to form a customized methodology.

Users can generate ready-to-compile C, C++, and Ada source code and can customize code in the following manner: by modifying how code is generated for an existing design symbol or relations; by specifying how code is to be generated for a newly created symbol; by generating a new language from a pre-existing or new methodology; and by generating other forms of output from a design (data dictionary, documents, etc.).

Schottland attributes the tool's flexibility to its modular design. The developers took two years to develop the original product, with the belief that it was best to "build a big base before moving forward," he recalled. Specifically, their strategy was to "build modules that make sense, and not couple things together too much."

This architecture enables the user to customize the method database in the tool preparation phase. This database is separate from the system database, which stores the designs created. Because of this design, "You're assured of consistency, because you're always coming out of one database," Schottland said.

Another advantage to this architecture is its ability to work with third-party databases, such as Oracle, and third-party development frameworks, such as HP SoftBench. Other tools integrate with third-party products, Schottland acknowledged, but he said Graphical Designer is unique in that, from its inception, it was designed to be a part of a process separate from the tool—the only tool to be "process-neutral."

He recalled that vendors used to have to supply everything in their CASE tools, because there was no development framework. Schottland commented, "(tool makers) sort of thought (tools) were going to be the center of the universe, as far as design goes." Noting that CASE tools are appropriate for the analysis, design, and implementation phases of the software development life cycle, he added that tool developers "need to understand that (CASE tools) fit on top of the other stuff," such as the need to establish the application requirements and to test the application.

Graphical Designer Version 1.1 was scheduled to be released in April of 1995. This new version adds reverse engineering and reengineering capabilities. It runs on HP and Silicon Graphics workstations. Pricing starts at $4,999 for the first seat and drops to $999 after the sixth seat. Training, telephone support, and consulting services are available.

Contact Advanced Software Technologies, Inc., 7800 S. Elati Street, Suite 300, Littleton, Colorado 80120, phone (303) 730-7981, e-mail: info@advancedsw.com. ◧

Michelle Pollace, the New Products editor for hp-ux/usr, *writes Product Focus.*

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New Products

UNIX-Novell Printing

Digital Controls Corporation has announced NovPrint, a NetWare NLM that provides bidirectional UNIX-Novell printing. Using NovPrint, UNIX users can route print jobs from UNIX hosts into a NetWare queue so work can be accessed by printers on file servers, NetWare workstations, and by print-dedicated PCs. UNIX commands, such as *lp* and *lpr*, will not change when printing to NetWare printers because the line printer daemon (*lpd*) is emulated.

NetWare clients can route print jobs from NetWare server print queues to printers on UNIX hosts or terminal servers supporting TCP/IP connections. Jobs can be routed to or from any NetWare print queue on the network. Existing NetWare print queues are used, so utilities, including CAPTURE and NPRINT, will not change for NetWare users printing to UNIX printers.

NovPrint is available for NetWare 3.11 or greater and is priced at $595. The product is available through UniDirect and other distributors.

Contact Digital Controls Corporation, 305 Pioneer Blvd., Springboro, Ohio 45066, phone: (800) 274-1627 or (513) 746-8118.

Native OS/2, Windows 95

MiniSoft Inc.'s terminal emulator, MiniSoft 92 for Windows, now incorporates 32-bit architecture for emulation of OS/2 and Windows 95 operating systems. Version 3.5 of MiniSoft 92 for Windows (Win92) also offers enhanced 16-bit capability.

Users can now make NS/VT or Telnet connections with any TCP/IP stack that supplies its own WinSock. In addition, Win92 includes an optional WinSock-only connection (WS92), which is optimized for operating over third-party stacks. Besides taking significantly less memory, WS92 uses just 250,000 bytes of disk storage.

Win92 now features network file transfer that allows users to move files at network speed: Network File Transfer for transfers from the HP 3000 and an FTP Client for transfers from UNIX systems. Object Linking and Embedding (OLE) in Windows is also supported.

Full-featured VT320 terminal emulation, including full keyboard remapping, is now added. In addition, the emulator's command language now includes more than two dozen scripting commands, which are fully documented in the new manual. Win92 Version 35 also includes new scalable fonts that shrink or grow according to the size of the display. In addition, users can position the Win92 window anywhere on the screen and save its position in a configuration file.

Win92 costs $179 per copy. Volume discounts and site licenses are available.

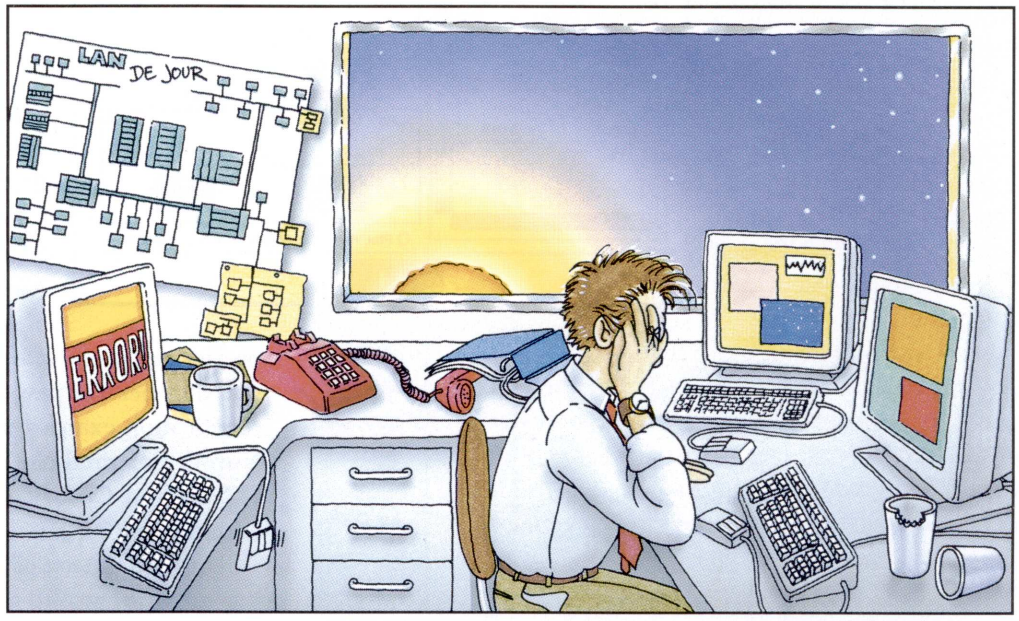
Contact MiniSoft, Inc., 312 Maple Avenue, Suite A, Snohomish, Washington 98290, phone: (800) 682-0200, fax: (206) 568-2923.

Multiplatform Configuration Management

Diamond Optimum Systems has announced Release 3.5 of its configuration management toolset, VCS, which utilizes client-server technology to provide a single point of control for software development activities on UNIX, MPE/iX, and desktop platforms. The complete solution includes automatic documentation, impact analysis, version control, and software distribution.

Release 3.5 fully supports environments consisting of the HP-UX, IBM

Did all your jobs make it through the night?



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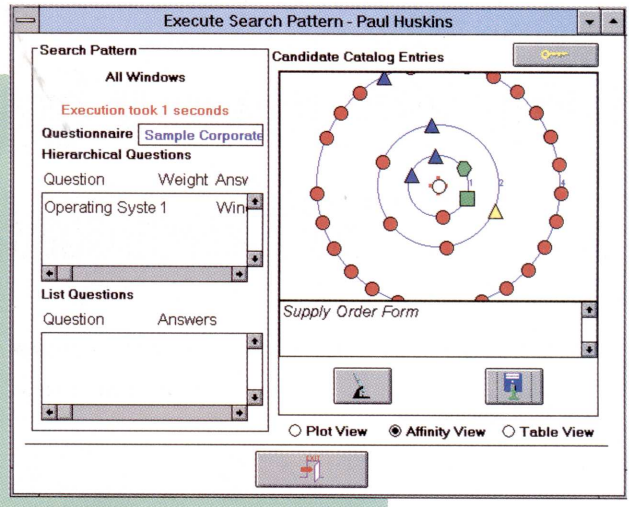

Bullseye

Object-Oriented Development

ObjectSpace, Inc. has announced a new object-oriented product line, containing ObjectSockets, ObjectSystems, ObjectMetrics, and ObjectCatalog, to give developers a choice of products for Smalltalk and C++ environments.

ObjectSystems is a complete C++ framework for professional cross-platform UNIX systems development. It is an object-oriented layer between the application and UNIX that hides the details of difficult-to-use system calls, error detection, and cryptic flags.

ObjectSockets is a class library with more than 40 classes representing all aspects of TCP/IP communications, including TCP sockets, UDP sockets, IP addresses, hosts, networks, protocols, and services. It hides the details of WinSock API calls, error detection, and cryptic flags. ObjectSockets comes with full source code, a comprehensive user guide, and a tutorial.

ObjectMetrics enables SmallTalk programmers to obtain valuable metrics that indicate problem areas such as overly complex code and unnecessary coupling between modules. It also uses an intuitive GUI.

ObjectCatalog's distributed publish and search capabilities allow enterprises the ability and benefits of reuse.

Pricing for the products are ObjectSystems, $875 per user; ObjectMetrics, $595 per user; ObjectSockets, $695 per user. Site licensing is available. Prices for ObjectCatalog, scheduled for release by the end of 1994, had not been announced at time of writing.

Contact ObjectSpace, Inc., 14881 Quorum Drive, Suite 400, Dallas, Texas 75240, phone: (214) 934-2496, fax: (214) 663-3959.

AIX, Sun Solaris, HP MPE/iX, MS Windows, MS Windows NT, OS/2, and Macintosh platforms. Release 3.5 also includes a project management and problem tracking module.

Contact Diamond Optimum Systems, 22801 Ventura Blvd., Suite 105, Woodland Hills, California 91364, phone: (800) DOC.VCS.1 or (818) 224-2010, fax: (818) 224-2009, e-mail: DiamondOS@aol.com.

32-PPM Laser Printer

Ganson Engineering, Inc. has announced a 32 page-per-minute (PPM) laser printer with a 300,000 pages-per-month duty cycle.

Standard features include PCL5 printer emulation, Microsoft True-Image PostScript with automatic switching of the active language, 8 MB of RAM expandable to 28 MB, industry-standard SIMM support, and low energy consumption. Fonts include 35 TrueType outline fonts, 14 Laser II and III bit-mapped fonts, and 13 Scalable typefaces. The G32 also comes with 12 months of on-site maintenance.

G32 laser printer options include Duplex printing, high-capacity input feeder (2,000 sheets) and stacker (1,800 sheets), PostScript compatibility, direct-network connectivity for all computing platforms (i.e., IBM, DEC, Wang, HP, etc.), a hard disk drive for storing fonts and forms, and a 5- or 10-bin sorter/stacker unit.

The G32's introductory base price is $9,950.

Contact Ganson Engineering, Inc., 18678 142nd Avenue NE, Woodinville, Washington 98072, phone: (206) 489-2090, fax: (206) 489-2088.

CNA/CNE Certification Study Guide

McGraw-Hill has announced *The Novell CNA/CNE Study Guide*, said to provide test-takers with all the information they need to pass the two primary certification exams available through Novell: Certified NetWare Engineer (CNE) and Certified NetWare Administrator (CNA).

Through the use of hands-on learning techniques and a goal-oriented approach to studying, certification experts John Paul Mueller, CNE, and Robert A. Williams, CNE, CNI, help readers get their certifications faster and with more certainty than just about any other method, the publisher notes.

For each course of study, this book/disk combination includes tactile tutorials, as well as a section containing actual Novell questions and answers. Emphasizing the importance of learning how to look at things from the Novell perspective, Mueller and Williams also explain why a given answer is the correct one.

The disks that come with *The Novell CNA/CNE Study Guide* contain such helpful study tools as a sample exam based on the one given at Drake Testing Centers and a comprehensive Windows file-viewing utility readers can use to look up the questions, answers, and explanations they need to master a particular area of interest.

The Novell CNA/CNE Study Guide by John Paul Mueller and Robert A. Williams (ISBN 0-07-911904-2) costs $38.95. This paperback book is 352 pages long and contains 180 illustrations. It is available in bookstores or from the publisher.

Continued on Page 86

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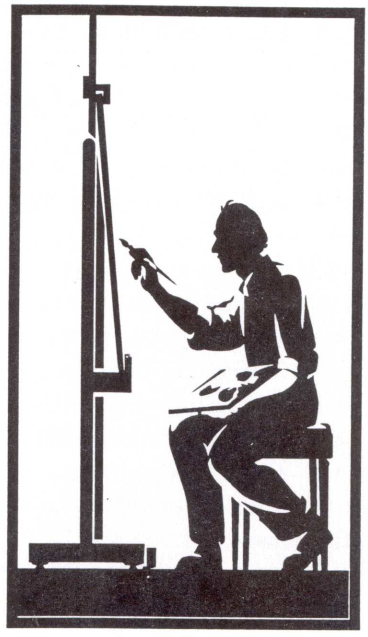

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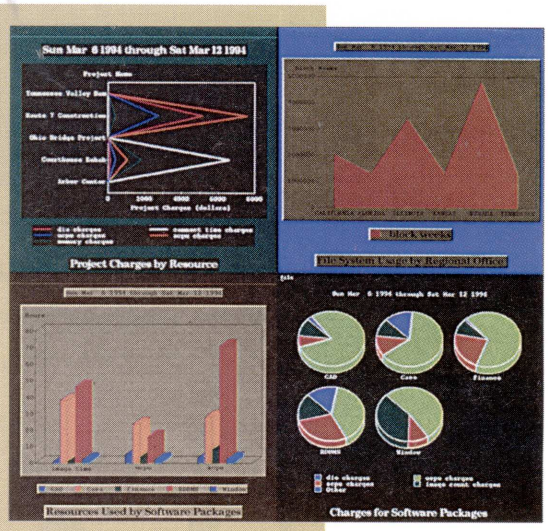
System Accounting Software

GEJAC, Inc. has announced ARSAP 4.0 resource management and chargeback software. It provides the systems administrator with usage accounting information and can be operated completely through one utility. The optional color graphics module produces files that can graphically display system resources within any parameter.



GeJac, Inc. ARSAP 4.0

ARSAP 4.0 accounts for the use of system resources by user, project, section, or department on any multi-user system or workstation, and in any application. It supports an unlimited number of workstations, nodes, users, and projects in the NFS and Windows environments. Administrators can allocate system costs however they choose, and rates can be set for any resource by user, project, or node.

The application tracks connect (seat) time, CPU time, file space, logins, disk I/O, and other system resources. It displays resource management and chargeback information in bar charts, pie charts, area charts, and plots. Its graphics module produces files suitable for printing on PostScript, HP LaserJet, HP PaintJet, and IBM PP3812 printers, and it can create X Window dump files.

ARSAP 4.0 GUI operates across all major UNIX systems supporting X11 Release 5. The graphics module operates across HP-UX and other UNIX platforms.

Contact GEJAC, Inc., 8643 Cherry Lane, Laurel, Maryland 20707-6210, phone: (301) 725-2500, fax: (301) 725-7196, e-mail: info@gejac.com

Contact McGraw-Hill, Blue Ridge Summit, Pennsylvania 17294-0850, phone: (800) 822-8158.

New from Enterprise Solutions

Fax Server

Enterprise Solutions Limited (ESL) has announced a high-volume fax server for X.400 EXM Mail. EXM/FAX Server resides on the same server as the system or department X.400 message transfer agent and provides inbound and outbound fax delivery. There is virtually no limit to the number of simultaneous lines that can be in operation, using multiline boards and/or multiple slave units. These slave units can have up to eight multiline boards each.

Every user can have an individual phone number, with all faxes received by the central fax server and then routed to the individual mailbox. Alternatively, each electronic fax machine user can have a four-digit extension to the main fax number, and incoming faxes can be routed from the fax server to the appropriate mailbox.

EXM/FAX enables administrative control of access restrictions, providing a table of telephone prefixes and a tariff table to differentiate destination zones, and allows fax messages to be submitted to a distribution list upon receipt by the server.

Pricing starts at $10,000, with a single-line fax board.

EDI Packages Interface

Enterprise Solutions also announced the EXM/EDI Enabler, which integrates EDI and EXM Mail in an X.400 platform. It is available with the EXM User Agent and requires only a single-user mailbox at a Message Store. Users can set specific parameters for the sending and receiving of EDI files.

EXM/EDI Enabler allows an EDI translation and Management Package to be incorporated into the desktop environment. The EXM/EDI Enabler P7 protocol can be configured at startup to interface with all available 1988 X.400 P7 Message Store servers. Users on a LAN can connect to the Message Store from their desktop; remote users can access the Message Store asynchronously via a modem. The product supports all P2 Heading fields, and supports X.435 (Pedi) Messages. The X.400 P3 protocol provides an alternative for interfacing to a 1984 mounted file system MTA.

EXM/EDI Enabler comes integrated with the EXM/UA and is priced from $120 to $450 per user agent, depending on quantity.

Contact Enterprise Solutions Limited, 2900 Townsgate Road, Suite 210, Westlake Village, California 91361, phone: (805) 449-4181, fax: (805) 449-4186.

Higher Education EIS

Datatel Incorporated has announced the TopView Executive Information Service, which gathers and displays summary information to help higher education executives and managers identify key business trends, data relationships, and exceptions. It is said to be the first EIS in higher education to retrieve and combine institutional information from multiple databases, including Datatel's Colleague and Benefactor products.

Enrollment management directors can segment the student population into groups based on specific characteristics and compare them against each other as well as against peer institutions, for example. Once users have reviewed summary information in colorful charts, graphs, and tables, they can drill down

to get a closer look at diverse and extensive details.

The TopView support package includes consulting, training, documentation, and response line support. Datatel and its clients together build a library of informative reports to be shared among all TopView users. Key industry reports are available in the four functional areas of Datatel's products: Alumni and Development, Financial, Human Resources, and Student.

Contact Datatel, Inc., 4375 Fair Lakes Court, Fairfax, Virginia 22033, phone: (703) 968-9000.

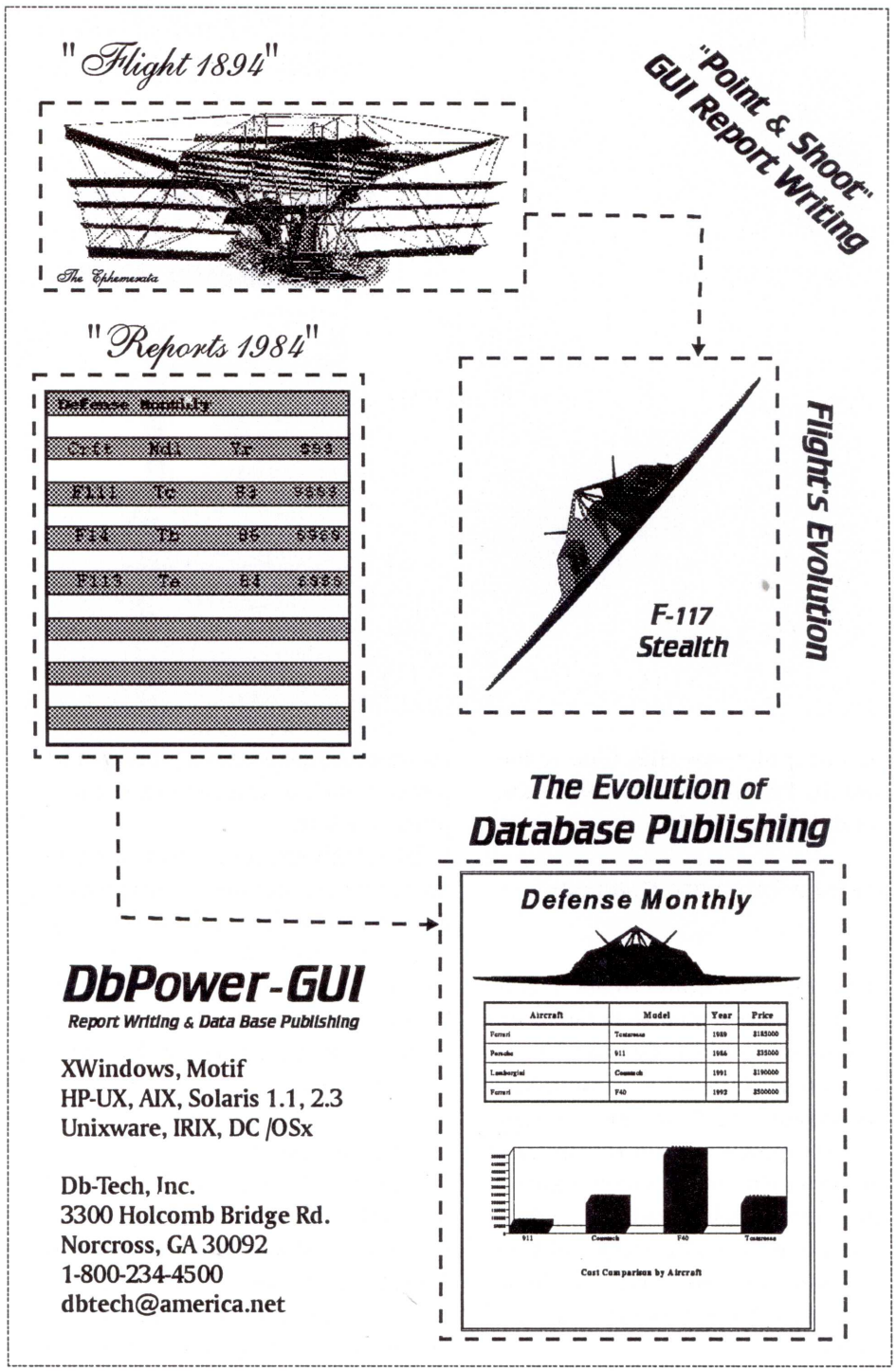
Document Management

Documentum Inc. has announced Release 2.0 of the Documentum Enterprise Document Management System (EDMS). The new Virtual Document Manager (VDM) manages all the collaborative efforts involved in managing and assembling configurations of business-critical documents. Release 2.0 also includes expanded workflow capabilities for defining, initiating, and processing complex workflows. Documentum's Quickbuilder, a new screenpainter product, allows easy customization of the user environment.

The Documentum EDMS includes the Documentum Workspace, a graphical user environment; the Documentum Server, featuring a set of services for all information objects; and the Documentum Toolkit, a set of APIs for building custom solutions.

Through Adobe's Acrobat Exchange, Documentum has provided an annotations interface that allows approved users to view "sticky note" annotations associated with a document.

Release 2.0 of the Documentum Workspace is available on Microsoft



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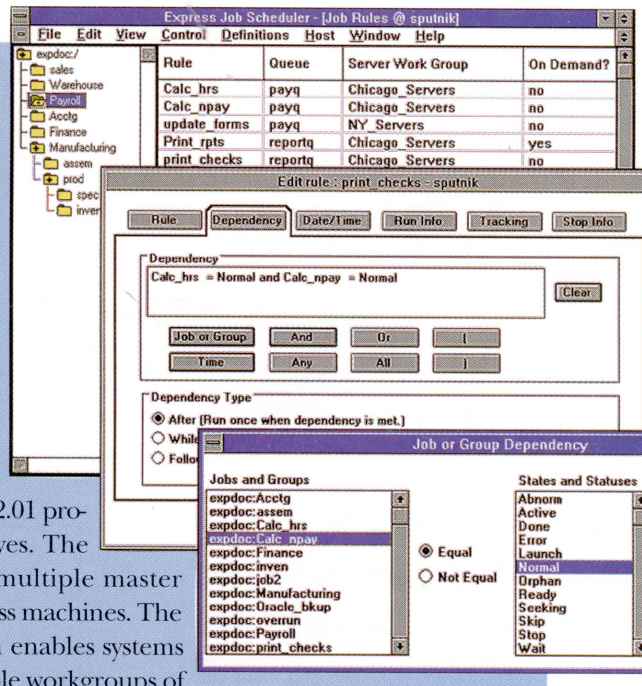

OCS Express for UNIX 2.01

Job Scheduling

Operations Control System (OCS) has announced EXPRESS for UNIX 2.01 job scheduling software. EXPRESS Version 2.01 offers capabilities that increase UNIX system fault tolerance; improve scheduling efficiency for complex, interdependent production jobs; and deliver a new level of ease of use to systems administrators, computer operators, and end users.

EXPRESS for UNIX Version 2.01 provides two scheduling alternatives. The interprocess option enables multiple master schedules to be distributed across machines. The expanded runtime host option enables systems administrators to specify multiple workgroups of remote host machines for a single master schedule.

Version 2.01 makes it easy for end users as well as operators and administrators to gain access to their own customized reports. A new toolbar has been added to the EXPRESS production status window, enabling operators to easily filter out unnecessary information and narrow the window to view jobs on an exception-only basis.

EXPRESS command control can be placed at the group level, the job rule level, or at any combination of groups and rules, and GUI-based commands can be applied either to the entire groups or to individual job rule instances.

EXPRESS for UNIX 2.01 is available immediately on HP-UX, AIX, and Sun platforms. Pricing begins at $5,000 and is based on system configuration.

Contact OCS, 560 San Antonio Road, Suite 106, Palo Alto, California 94306, phone: (415) 493-4122, fax: (415) 493-3393.

Windows and Macintosh and is scheduled for availability on Motif clients in the first quarter of 1995. Release 2.0 of the Documentum Server is available on Sun Solaris and HP-UX servers.

Pricing ranges from $500 to $1,500 per seat, depending on configuration and size of deployment.

Contact Documentum, Inc., 4683 Chabot Drive, Suite 102, Pleasanton, California 94588-2748, phone: (510) 463-6800, fax: (510) 463-6850.

New from Computer Associates

Unicenter SNMP Support

Computer Associates has announced CA-Unicenter 1.1, which offers SNMP support for integration with such popular network management platforms as HP OpenView, SunNet Manager, and NetView 6000. Release 1.1 adds significant new functionality to all of the integrated CA-Unicenter systems management disciplines including file backup, archive and automatic restores, help desk, security, job scheduling, report distribution, and event management.

CA-Unicenter events act like any other significant exceptional network event. Depending on user configuration, the network topology map blinks or changes color. As a registered network application, CA-Unicenter takes predefined actions affecting its own behavior (such as rerouting a print job) or executes a preprogrammed sequence (such as issuing an e-mail). Receiving SNMP traps and a wide variety of non-SNMP events (such as those logged by the system), CA-Unicenter's event management facility can monitor and interpret the event before taking predetermined action.

CA-Unicenter 1.1 is available at no additional charge to clients with active maintenance contracts.

Application Development

Computer Associates has begun shipping database drivers for its multiplatform application development product, CA-OpenROAD. Drivers include full, integrated support for CA-Ingres, Oracle, Microsoft SQL/Server, and Sybase databases.

Developers can now create new database-independent applications in the CA-OpenROAD environment or deploy existing CA-Windows 4GL applications against CA-Ingres, Oracle, Microsoft SQL/Server, and Sybase. The application is developed once and then deployed on different platforms against multiple databases without changes to the application itself.

CA has bundled these new database drivers as part of the CA-OpenROAD Success Pack, with pricing at $420 per user for a 16-user license on Windows NT. In addition to the database drivers, the Success Pack includes the CA-Ingres/Net software that transparently ties PCs to servers, a pre-compiler, and a query and reporting tool for end users.

Continued on Page 90

Interex '94 Conference Proceedings

The Conference Proceedings are a great way for HP users to capture all the information available at the conference. The proceedings from Interex '94 in Denver contain final paper presentations of all scheduled sessions. If you were unable to attend the conference, you can catch up on all the sessions you missed. All CSL/Site-level members who did not attend the conference automatically received a copy of the proceedings following the event, but additional copies are available.

Proceeding rates are as follows:

CSL/Site-level members additional copies	$60
General-level members	$60
Non-members	$80

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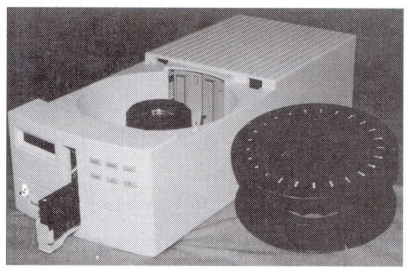

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CIRCLE 43 ON READER SERVICE CARD

CD-ROM Recording System

Concorde Technologies, Inc. has introduced CD-Master for creating CD-ROM discs on UNIX systems. CD-Master consists of the Mastering Software, the Intelligent Controller, and the CD Recorder. It produces CDs with industry-standard file systems that are readable by any system that supports CD-ROMs. Through a graphical interface, users select, from either a local workstation or from across a network, data to be included on the CD being produced.

The Intelligent Controller contains an internal hard disk that stores the premastered data. The CD-Master Intelligent Controller connects to the UNIX system through a SCSI interface, but it does not require a dedicated SCSI port; it can be daisy-chained with existing SCSI devices. While sending data to the CD Recorder, CD-Master can create UNIX system (UFS) discs for a complete backup of the UNIX system.

It provides complete POSIX file system support and conforms to ISO 9660. The Mastering Software uses either the Rock Ridge Extensions or Original Name Recovery.

Concorde's new CD-Master System product is available with a number of different CD recorders, priced from $14,995 to $39,995. The CD-Master System supports UNIX systems, including the HP 9000. No operating system kernal modifications are required.

Contact Concorde Technologies, Inc., 6370 Lusk Blvd., Suite F100, San Diego, California 92121, phone: (619) 458-0702, fax: (619) 458-0722

Contact Computer Associates International, Inc., One Computer Associates Plaza, Islandia, New York 11788-7000, phone: (516) 342-5224, fax: (516) 342-5329.

Video Card

Parallax Graphics has announced XVideo700, an EISA-based video card offering full-size, full-motion, true-color video for HP 9000 Series 700s. The included Video Development Environment is intended to help developers create applications that are interoperable with applications developed for Sun workstations.

XVideo700 lets users display, digitize, compress, and store video. The Video Development Environment provides an API, sample programs, and widget-based toolkit, as well as source code for MovieTool and VideoTool, applications for capturing and displaying still and motion images. These applications can be integrated with HP MPower 2.0, HP's collaborative multimedia product. XVideo700 includes a Universal Cable Kit for demonstrations and testing in a variety of system configurations.

The XVideo700 includes hardware-assisted motion JPEG compression and decompression. New features include the ability to display two live video streams simultaneously in two 640 × 480 resolution windows, S-VHS support, zoom to full screen, and analog output of the video window to a video projector, monitor, or VCR.

Parallax VideoStream technology supports simultaneous video windows and fast frame rates, making it especially suitable for performance-intensive applications like desktop videoconferencing and video-on-demand.

XVideo700 is available for $7,485. Parallax offers comprehensive technical support and a one-year hardware warranty.

Contact Parallax Graphics, Inc., 2500 Condensa Street, Santa Clara, California 95051, phone: (408) 727-2220, fax: (408) 980-5139, e-mail: info@parallax.com.

Connectivity Tools

Pericom Inc. has announced Version 3 of *teemtalk* for Microsoft Windows and *teemX* for X Window-based UNIX/VMS. New features include additional emulations (ANSI BBS, Data General D410, IBM, 3151, Wyse 50/50+, 60); user-definable mouse button functions for integration with host applications; additional file transfer options via Zmodem and FTP; toolbar/floating button palette (*teemtalk* for Windows only); optional API compatible with IBM HLLAPI; and additional European language support for Swedish, Dutch, Danish, Finnish, Norwegian, Italian, French, and German.

These are in addition to the product's existing features: file transfer, scripting language, DDE (*teemtalk* for Windows only), hotspots, soft buttons, keyboard remapping, auto color mode, and connection templates.

The *teem* range provides multiple terminal emulations all in one, now supporting ANSI, DEC, IBM, Data General, Hewlett-Packard (HP2392A, HP2622A, HP700/92), Prime, Retrographics, Tandem, Tektronix, Viewdata, Westward, and Wyse.

Version 3.0 of *teemtalk* for Windows is priced from $195. *teemX* is priced from $499.

Contact Pericom Software Inc., 9 Princess Road, Suite D, Lawrenceville, New Jersey 08648, phone: (609) 895-0404, fax: (609) 895-0408.

Warehouse Management

Catalyst USA, Inc. has announced the Catalyst Warehouse Management System (WMS) Version 5.0. The UNIX-based system provides full control over every facet of a warehousing operation: receipt, storage, replenishment, and all levels of picking and loading of a truck. The system manages everything from inventory to personnel and material handling equipment.

Continued on Page 93

Sign up NOW for Fall 1995 Listings

hp-ux/resource directory

The *hp-ux/resource directory* is a complete resource guide for HP-UX users seeking answers. This is one of the industry's most extensive reference guides for HP-UX products, services, and vendors. It will be devoted entirely to HP 9000 users operating in multi-user, workstation, and multi-system UNIX environments. This bi-annual directory, published each year in March and September, is a separate publication mailed out with *hp-ux/usr* magazine, the only HP-specific publication on the market.

Each company is listed by category, with each listing including company name, product, operating environment, and phone number. The cost for a full year listing in the *hp-ux/resource directory* is $475. Discounts are available for current advertisers in *hp-ux/usr*, *Interact* or the *Vendor Service Source Directory*. Advertisers who run more than one listing per issue also receive a discount. There is a 75-word maximum per listing, with a charge of $1.00 per word over the maximum.

The Fall 1995 *hp-ux/resource directory* will be published in **September** with **all listings *due* by May 5, 1995.** For further information contact Liana Fisher at the Interex Advertising Department 408.747.0227 or 800.468.3739. Fax: 408.747.0947. Written inquiries should be addressed: Liana Fisher, Interex, 1192 Borregas Avenue, P.O. Box 3439, Sunnyvale, California 94088-3439 U.S.A.

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Accounting Software
Application Development Software
Application Development Tools/4GL
Application Software Design
Backup Hardware
Backup Software
Bar Code Data Collection Systems
Batch Job Management
Business Software
CAD Software/Hardware
Case Tools
Change Control
Change Management Tools
Civil Engineering
Client-Server
Communications
Communications Servers
Communications Software
Consulting
Consulting/Systems Integration
Customer Support/Help Desk Systems
Database Management Systems
Database Management Tools
Data Center Management
Data Warehousing
Decision Support Systems
Depot Repair/On-Site Management
Desktop Publishing
Disaster Recovery
Disk Drives
Distribution Software
Document Management
Electronic Data Interchange (EDI)
Electronic Form Printing
Electronic Mail and Directory Integration
End-User Computing
Executive Information Systems
Fax Automation
Financial
Font Creation and Manipulation
Fourth Generation Language
Full-Screen Editor
Government
Graphics
Hardware
Hardware/Mass Storage
Hardware Subsystems
Help Desk Management
Hierarchical Storage Management
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Image Storage and Retrieval Management
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Integration Tools
I/O Boards
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Maintenance
Manufacturing
Manufacturing Software
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Math Libraries
Memory
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Migration Tools
Multimedia
Municipal Software
Network Backup Software
Network Integration
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Networking
Networking Systems
Operating System
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Performance Software
Personal Information Manager
Personnel Management
Pointing Devices
Pre- and Post-Print Automation
Print Management
Process Control Software
Project Management
Protocol Converters/Interfaces-Hardware
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Purchasing
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Terminal Emulation
Text Editors
Time and Billing
Time Reporting Terminals
Training
User Groups
Utilities
Workstations

Other categories may be created as needed.
See reverse side for listing form

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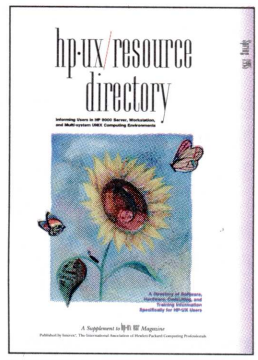
hp-ux/resource directory

FALL 1995 Listing Form

The Interex ***hp-ux/resource directory*** is published two times a year and mailed with *hp-ux/usr* magazine. **The cost for a single listing in two issues is $475.** Each additional listing is $375. Discounts are available for current advertisers in *hp-ux/usr, Interact,* or the *Vendor Service Source Directory.* For additional listings, please duplicate this form. The maximum number of words per listing is 75, excluding company name, address, product name, and operating environment. There is a charge of $1.00 per additional word for each listing. The fall 1995 ***hp-ux/resource directory*** will be published in **September** with **all listings *due* by May 5, 1995.**



Spring 1995 ***hp-ux/resource directory***

Company logos can be placed with listings. The cost is $100, with discounts available for multiple listings. Maximum size is 3/4 inches high by 1-1/2 inches wide.

NEW

Product photos can now be placed with listings. The cost is $100 per photo, with discounts available for multiple listings. There is a $75 charge for changing photos between issues. Photos must be submitted in either 35mm slides, 4x5 transparencies, or up to 4x6 **GLOSSY** prints (black and white or color). The actual size the photo will appear in the publication is 2 3/16" wide and the height will be determined by the orientation of the original photo (horizontal or vertical).

(Please fill in all information completely—**ONLY** typewritten or clearly printed copy will be accepted)

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Product Name _____

Operating Environment _____

Product Description (MAXIMUM 75 WORDS) There is a $1.00 per word charge for all listings over 75 words. If you need more space, please type or clearly print copy on a separate sheet and attach to this form.

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PAYMENT OR PURCHASE ORDER MUST ACCOMPANY ALL ORDERS

Dataram DTM4000

RAID Subsystem

Dataram Corporation has announced the DTM4000 Series RAID subsystems. The DTM4000's significant performance boosts are a result of a new controller architecture, which delivers throughput capabilities of more than 3,000 I/Os per second. In addition to performance enhancements, the PCI bus allows the DTM4000 to quickly incorporate emerging interface technologies (such as Fast-20 and Fibre Channel).

The DTM4000 subsystems are based on a modular, flexible design. The DTM4000 provides selectable levels of fault tolerance and data availability with support for RAID levels 0, 1 (10), 3, and 5. DATARAID storage solutions feature an easy upgrade design and built-in technology migration path.

The DTM4000 is available in a pedestal configuration, which houses from 5 to 20 full-height 3.5-inch disk drives, or an industry-standard 19-inch rack mount configuration, which houses from 5 to 30 disk drives. The subsystem's overall storage capacity ranges from 10.5 to 128.7 GB, with either single or dual active controller configurations.

All components in the DTM4000 are customer-replaceable and hot-swappable while the unit is fully operational. Standard warranty on all subsystem hardware is five years.

Pricing on the DTM4000 subsystems starts at $33,300 for single quantities. Quantity pricing is available upon request.

Contact Dataram Corporation, P.O. Box 7528, Princeton, New Jersey 08543-7528, phone: (800) DATARAM or (609) 799-0071, fax: (609) 799-6734.

The Catalyst WMS, available off-the-shelf, supports multilingual users and sites, allowing users to select a site language and as many user languages as required. Users interact with the system in their own language, and reports are generated in the site language.

Catalyst WMS Version 5.0 offers flow-through support, which is targeted to major retail-type operations that "push" a large portion of their merchandise out to their stores at time of receipt.

The catalyst system will assign stock rotation based on arrival date, date of manufacture, warehouse expiration date, consumer expiration date, and an incubation hold and release date. It also supports directions for materials to be placed and removed from hold and will prevent the picker from using material on hold. Version 5.0 supports multiple simultaneous holds.

Prices are based on the number of users and start at $150,000, for 1 to 25 users.

Contact Catalyst USA, Inc., 8989 N. Deerwood Drive, Milwaukee, Wisconsin 53223, phone: (414) 377-9400 or (800) 236-4600, fax: (414) 377-6263.

New from WRQ

Kanji PC X Server

WRQ has launched Reflection X, the first fully localized PC X server for the Japanese market. The product provides online help, all documentation, and the entire user interface in Kanji. Reflection X is a 32-bit application that gives PC users access to network applications based on the X protocol. Enhancements include fully localized user interface for Reflection X; fully localized user interface for Reflection FTP; network support for TCP/IP stacks popular in Japan; support for Japanese NEC PC9800 and Epson (NEC-compatible) PCs; support for copying and pasting Japanese characters between Reflection X and other Windows applications; and X server support for double-byte fonts.

Reflection X is available in Japan through Cybernet Systems in Tokyo (phone: 81 3 5978 5410, fax: 81 3 5978 5440) or by contacting WRQ corporate headquarters.

TCP Connectivity

WRQ has announced the Reflection Suite for TCP, said to be the only TCP/IP product that combines the performance benefits of VxDs with the reliability of DLLs. The Reflection Suite for TCP includes all standard communications protocols (TCP, UDP, IPX, LAT, SLIP, and CSLIP) and works with standard wireless protocols—circuit-switched cellular (CSC) and cellular digital packet data (CDPD).

The Reflection Suite for TCP includes Reflection 2 for Windows for VT320 (telnet) connectivity, RTP client, FTP server, graphical Ping, Finger, and LPR/LPD printing services. WRQ's TCP connection is 100 percent Winsock-compliant. The suite will run any application written for VT320, VT220, VT102, and VT52 terminals. Point-and-click graphical keyboard mapping makes it easy to reconfigure the user interface. Support for dynamic data exchange (DDE) lets users exchange information between host and PC applications. Fonts rescale proportionally when the user resizes a window, and users can customize up to 40 buttons on a palette. Reflection supports international character sets.

The Reflection Suite for TCP is priced at $399 for a single-user copy. Volume and site license pricing are also available. The Reflection Suite for TCP is available directly from WRQ or from a worldwide network of distributors, resellers, and VARs.

Contact WRQ, 1500 Dexter Avenue North, Seattle, Washington 98109, phone: (800) 872-2829 or (206) 217-7100.

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52	**Abtech** (800) 474-7397	27
61	**Brixton Systems** (800) BRIXTON	25
45	**Camintonn/Z-Ram** (800) 368-4726	C-2
150	**Computer Marketing International** (800) 497-4264/Fax: (508) 689-2031	75
55	**Concorde Technologies** (800) 359-0282/Fax: (619) 458-0722	59
140	**C.S.U. Industries, Inc.** (516) 239-4310/Fax: (516) 239-8374	49
35	**Db-TECH** (800) 234-4500	87
43	**Dallastone** (603) 647-8168	89
51	**Data Assurance** (800) 654-1689	51
34	**Design 3000 Plus, Inc.** (503) 585-0512/ Fax: (503) 585-1706	41
121	**Diamond Optimum Systems, Inc.** (818) 224-2010 or (800) 362-8271	35
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31	**Eagle Software** (800) 477-5432	55
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92	**ITAC Systems, Inc. – Mouse-Trak** (214) 494-3073/Fax: (214) 494-4159	5
114	**International User Conference** 011 49 711 976 7114, Fax: 011 49 711 976 7116	65
146	**Interworks '95** (508) 436-4460	53
170	**MDL** (800) 800-3766	85
47	**Monterey Bay Communications** (408) 429-6144/Fax: (408) 429-1918	1
85	**Newport Digital Corporation** (800) 383-3642/Fax: (714) 730-3951	13
26	**ORBIT Software** (800) 6-Online or (510) 837-4143	31
95	**Pericom, Inc.** (609) 895-0404/Fax: (609) 895-0408	39
13	**Platinum Technology** (800) 492-7528	83
54	**Qualix Group** (415) 572-0200	15
152	**RAC Consulting** (206) 357-9572/Fax: (206) 352-8453	17
4	**Robelle Consulting Ltd.** (604) 582-1700/Fax: (604) 582-1799	29
33	**Software Licensing Corp.** (702) 832-0881	89
143	**Technical & Scientific Application** (800) 422-4872/Fax: (713) 935-1555	73
49	**Ted Dasher & Associates** (800) 638-4833/Fax: (205) 591-1108	69
135	**Telamon** (916) 622-0630/Fax: (916) 622-0738	79
27	**Transitional Technology** (800) 874-8325	3
42	**TriTeal Corp.** (800) 874-8325	2
53	**Tryonics** (800) 551-6236	C-3
40	**VESOFT, Inc.** (310) 282-0420/ Fax: (310) 785-9566	75
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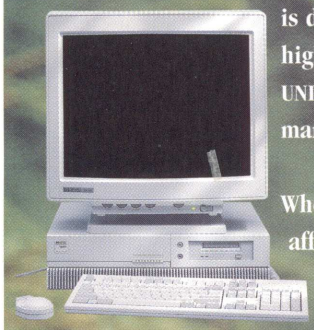

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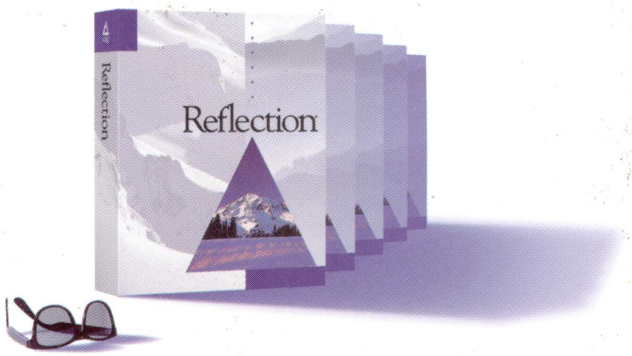

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